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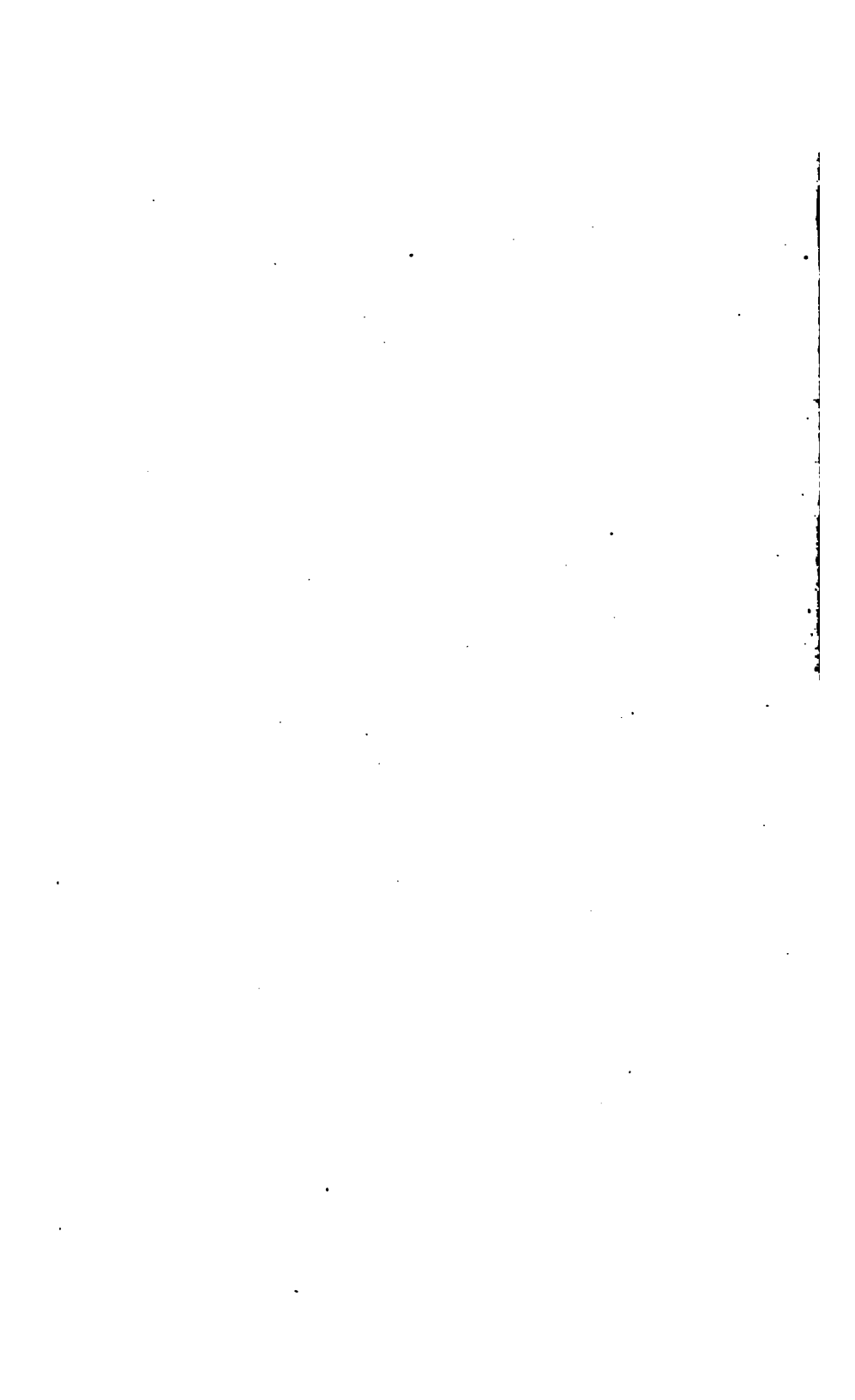
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ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

MONTREAL WATER WORKS

FOR THE

YEAR ENDING 31st DECEMBER, 1878.

...

Printed by Order of the Water Committee.



Montreal :

LOUIS PERRAULT & Co., CITY PRINTERS

1879



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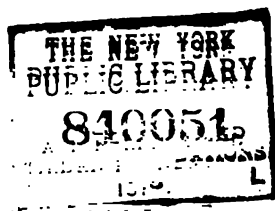
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ANNUAL REPORT

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SUPERINTENDENT OF THE MONTREAL WATER WORKS,

FOR THE YEAR ENDING DECEMBER 31st, 1878.

To the Mayor and Citizens of the City of Montreal.

GENTLEMEN,—In accordance with the by-law of your Council, I beg to present my Annual Report of the general condition of the Water Works with the suggestions I deem necessary to make.

The works under contract have all been completed. The work of the Inland Cut under the contractors, Messrs. F. B. McNamee & Co. has been accepted and the final estimate settled on the 25th of October last. Further details of the progress of that work will be found in the subjoined Report of Mr. B. D. McConnell, Assistant-Engineer. The final settlement with the Messrs. J. P. Whelan & Co., contractors for the Extension of the McTavish Street Reservoir, occupied my attention and that of the Water Committee during the whole year, and after many attempts at settlement, the matter was at last referred to arbitration. Three arbitrators were appointed, H. Bulmer, Esq., by the Corporation, J. Smith, Esq., by the Contractors, and J. C. Sippell, Esq., by the consent of both the Corporation and the Contractors. My final estimate of the work amounted to the total sum of \$354,133⁴³/₁₀₀, of which the sum of \$340,240²¹/₁₀₀ was already received by the Contractors, leaving a balance of \$13,893²²/₁₀₀. This balance the Contractors refused to accept as a final settlement and brought in a claim for \$49,355²⁹/₁₀₀, that is \$35,461²⁹/₁₀₀ more than my final estimate. The award of the Arbitrators was rendered on the 30th of January last and was for a sum of \$32,500, that is \$18,606²⁶/₁₀₀ more than my final estimate. This the Contractors accepted.

This delay in the settlement has prevented the carrying out of the additional works recommended in my last year's Report to protect

the banks as well as to improve the appearance of this Reservoir. There remains to be done the grading and sodding of the slopes, the making of water courses, the plastering of the eastern portion of the wall at the foot of the embankment.

These two large works have been in progress for several years past. That of the Inland Cut was begun in 1873 by the expropriation of the land, and the making of the excavation, stone work and bridges in the following years. The total cost of this work stands as follows

Cost of land	9,933.61
Contract for gates, iron works, bridges, &c.....	18,065.30
Donnelly's Contract.....	189,552.43
McNamee & Co.'s Contract.....	260,102.85
Surveys, Engineering and Sundries.....	37,022.69

8514,676.88

In this expenditure is included several additional expenses which properly speaking do not belong to the Inland Cut, (such are the surveys for all the other sections of the proposed Aqueduct, the building of gates at the entrance of the old Aqueduct) and which if these were deducted would reduce the total amount by several thousands of dollars and would bring it near my original estimate made in 1873 and which amounted to 479,850.

The extension of the McTavish Reservoir was begun in earnest in 1874 and has cost the total sum of..... \$398,243.05 of which the contract of Messrs. J. P. Whelan & Co.

took 372,740.21

The remainder..... \$25,502.84

went for sundry works and engineering expenses.

For this work there were appropriated at first a sum of \$233,000 in 1874, but subsequently the amount of excavation and masonry being found greater than at first anticipated, a further sum of \$107,400 was granted by the City Council in 1877, this also was found insufficient and the Water Committee had to come once more this year before the Council for an additional sum of \$47,843.03 to settle the claim of the Messrs. J. Whelan & Co. and provide for other expenditures already made.

PIPE LAYING.

The amount of Pipe laying done during the year has been the smallest that has been done for many years passed, and consists of the

laying of 1066 lineal feet of 6 inch and 993 lineal feet of 4 inch of cast iron main pipes, 2 stop valves of 6 inches and 5 of 4 inches, 7 fire hydrants and 465 services.

The total length of cast iron pipes laid in the City up to date is 22738 lineal feet of 30 inches, 27,666 feet of 24 inches, 2650 feet of 16 inches, 32578 feet of 12 inches, 66,682 feet of 10 inches, 7968 feet of 8 inches, 195,492 feet of 6 inches, 325,410 feet of 4 inches, 2386 feet of 3 inches and 8090 feet of smaller mains, making a total of 691,655 lineal feet of cast iron main pipes or 131 miles, nearly.

There are now laid 9 stop valves of 30 inches, 25 of 24 inches, 3 of 16", 41 of 12", 72 of 10", 9 of 8", 245 of 6", 530 of 4", and 32 of 3", making a total of 966 stop valves.

There are 823 fire hydrants including 37 private ones, and the total of houses supplied with water is 25,123.

AQUEDUCT.

The cleaning of the Aqueduct which had been suspended for several years past was resumed during last summer and a good deal of work has been done for the amount of money spent, that is, \$2592.⁶⁰/₁₀₀. With a similar amount, this year, I think the remainder of the cleaning can be accomplished.

As this work has proved very beneficial to the water supply, I recommend strongly that it be executed. This will be the means of postponing to a much later period the continuation of the New Inland Cut as far as the Wheel House.

A few repairs are necessary to be made to the banks, ditches, fences and bridges on the Aqueduct during next summer; mostly all the flooring of the farm bridges require renewing. There will be also 8 stop logs to be added to those of the regulating gates at the junction of the New Cut with the old Aqueduct.

At the Wheel House, things are in a fair condition considering that some of the water pumping machinery has been running for over 22 years.

The time is soon coming however to provide against any emergency which may occur as well as for additional wheels and pumps; otherwise more use of the steam power will have to be made when water in the Aqueduct would be sufficient to furnish power to additional water wheels.

The Report here annexed of Mr. Thos. Walsh, the Mechanical Engineer indicates all the repairs which have been done to the works under his control,

RESERVOIRS.

The Reservoir on McTavish street has been emptied during last summer for a few days in order to examine the depth of the Retaining walls, so as to verify the quantity of masonry in connection with Messrs. Whelan & Co.'s contract. This afforded also an opportunity for examining its condition of cleanness which was found satisfactory.

The usual care and surveillance to keep the place clean and in good order has been used by the keeper.

The Upper Level Reservoir at the head of Peel street has also been kept in good condition, and no other repairs have been required than the rebuilding of a portion of the revetment wall surrounding the McTavish monument. This wall which was of a poor quality of masonry had to be propped during the construction of this Reservoir in order to resist the pressure of the embankment thrown against it. The work was done by contract by Messrs. Plante & Dubuc, who made a good and substantial job.

HIGH LEVEL SERVICE.

The distribution of water by the High Level service has been done very regularly and the supply of water has been constant. By schedule No. 4 it will be seen that the pumping steam machinery has been at work for 2411 hours and has pumped 38,458,212 gallons 218 feet high with an expenditure of \$2996.18, or 35½ cents per millions of gallons raised one foot high.

DISTRIBUTION PIPES.

The usual repairs have been done to the distribution and service pipes amounting to the sum of \$7133.65. Thawing pipes and carting water \$298.83, inspecting services inside of houses \$1145.47, and repairs to streets and footpaths \$1118.36.

There have been 87 leaks on the main distribution pipes, of which 35 were broken or defective pipes, and 52 leakages at the joints. There have been also 12 old hydrants replaced by new ones, and 90 hydrants whose valves were renewed. These valves being made of leather cannot stand a great deal of wear and tear, although being considered the best for fire purposes. Their frequent usage in summer by the men watering the streets is the principal cause of their being put out of order, by their being shut carelessly and too suddenly when perhaps at that moment a piece of metal or gravel is engaged in the passage of the valve and its seat. The consequence is an indenta-

tants along the banks of the St. Lawrence and of the Ottawa, its tributary, and I am not aware that it has been condemned by sanitarians for its injurious effects upon the human system, but on the contrary has always been found by analysts a good potable water. I beg to refer to the analysis hereto annexed, made by Dr. Baker Edwards, for the Water Department, of four samples of water, compared as to hardness, organic impurities, and suspended matter, at different seasons of the year.

WATER METERS DEPARTMENT.

The number of water meters now in use is 427 of which 370 belong to the city and 57 to private parties. This department is under the control of two meter Inspectors, who alternately visit once every month the whole of these meters. This is done in order to afford a check against errors in the reading of the counters. When any of these meters is found out of order, or any new one is put in place, they are tested at the work shop where the necessary repairs and corrections are made by a proper person appointed for this purpose.

Schedule No. 8 in appendix gives their size, kind and where placed. The visit of house to house for detecting waste by defective pipes or otherwise, has been going on regularly, but the number of Inspectors, which is only two, is not sufficient to have this visit made to all the houses during the year. These visits in helping to check the waste of water are also bringing to the Revenue Department a good number of things which are taxable, and which are escaping registration in the assessors books, such as water closets, urinals, fountains, water privileges for manufactures, etc., thereby depriving the department of so much less water tax. I believe that the appointment of one or two more of these inspectors to enable a yearly visit to be made to all the houses or other buildings of the city, would increase the revenue a good deal more.

WATER WORKS SHOP IN THE CITY.

The Water shops in Lagauchetière street are still in a very dilapidated state and not fit to carry on properly the works of so important a department. It was hoped that during the course of last year something would be done to reconstruct them, but the question of bringing this branch of the Department to the building of the old drill shed on Craig street, has stopped the Water Committee from incurring any expense in new buildings. No decision has yet been arrived at by

water and the Department is suffering from it. I asked what is to be done. Before closing this year, the running expenses amounting to \$22,944 were within the amount appropriated at the beginning of the year which was \$22,944. This amount which was less than of the previous year was thought barely sufficient. The economy which was used, I am happy to say, has enabled me to carry out the work of the Department within the budget.

I remain Gentlemen,

Your obedient servant,

LOUIS LESAGE.

Supt. of W. IV.

100-1579.

APPENDIX.

MONTREAL JANUARY 24th, 1879.

LOUIS LESAGE, ESQ.,

Superintendent and Chief Engineer,

Water Works, Montreal.

SIR,

I beg to submit the following report of the work done on the 1st section of the new aqueduct, during the working season of 1878.

DREDGING.

The Dredging at the entrance was completed in accordance with the contract, besides which a trench some 20 feet in width and 3 feet in depth, with easy slopes on both sides was cut in front of the Entrance Bridge, from opposite the curved wing wall of one abutment to opposite the curved wing wall of the other. The object of this Trench is to catch sediment that might otherwise be carried to and deposited against the sills of the bridge, thereby becoming liable to obstruct the action of the Entrance Gates. A special contract was made with Messrs McNamee & Co., for this work. The quantity removed was only 500 cubic yards.

CLEARING ENTRANCE BRIDGE FOUNDATIONS.

The platform on which the Entrance Gates are to rest when in use, having accumulated a quantity of mud and boulders sufficient to prevent the closing of the gates, a diver was employed to clean it off. He, with a gang of five men, worked for eight days. They raised all the boulders, and raked the clay and gravel into the trench above mentioned. It was intended to have had the Regulating Gates cleaned by the Diver, but when he had finished at Entrance the season was too far advanced, so that matter was postponed.

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EXCAVATION OF AQUEDUCT.

The excavation of the aqueduct, (in the part done by Dredge) though it leaves the prism a different shape from that contemplated. The slope below the dry wall is in many places at the top, and cut away at the foot, whilst the centre is 50 feet or thereabouts is much below grade. The area exposed is not diminished (rather increased) and it was on this account the contractor was allowed to deviate slightly from the original shape, as it was found that the Dredge could not make the excavation.

JUNCTION.

No work was done to the Dam at the Junction since '77 as it was found to lower the water in the old aqueduct for a sufficient time to do anything worth while at it.

DITCHES.

All the ditches have been cleaned and are now in very good condition. The contractors have made a low wooden wall along the ditch banks (on the side next the aqueduct) where these are very steep slopes, to prevent the stuff washing in and clogging the ditches.

The ditches especially on the south side are partially filled with stuff washed from the spoil banks.

A new ditch has been cut from the Lower Lachine Road following the old Lachine Lane which divides the Corporation land from the Frazer farm, for a distance of 1900 feet, where it crosses the old aqueduct along its East side, on Corporation ground, for 600 feet, then crossing into the Frazer farm and keeping the lowest line of water level acquired by the Corporation from A. Robert, skirting the base of the Coteau on Dumberry's land, crossing Dumberry's Culvert and Sally's swamp to the south side of the pipe culvert under the aqueduct.

The ditch is about 4700 feet, and its main purpose is to discharge the water from the Water Basin, the drainage of that part of the Lower Lachine Basin between the Entrance Bridge and Frazer's Hill,

SLOPE WALLS.

The Slope Walls still require about 100 cubic yards to complete them, as reported last year, nothing having been done to them on account of the inconvenience of lowering the water in the old aqueduct.

DUMBERRY'S CULVERT.

The Culvert under Dumberry's road has been repaired and the embankment over it has been raised, but is still not up to grade, and not the required width in some places, but it is serviceable in its present condition.

CRIB WORK.

The Crib Work around the Still Water Basin has been completed.

FENCING.

The Fencing is completed.

PAINTING GIRDERS.

The painting of the girders of Entrance Bridge is completed.

REGULATING GATES BRIDGE.

The planking of the Regulating Gates Bridge has been spiked down.

LOWER LACHINE ROAD.

The diversion of the Lower Lachine Road approaching the Entrance Bridge from the Eastward has been completed.

RETAINING WALLS.

The dry rubble walls supporting the roadway at each end of the Entrance Bridge have been raised 16 inches by a coping of that thickness laid in cement mortar. A cobble stone drain has also been made to carry the water from the Bridge gutters, to the road side ditches. These two pieces of Work were done by Messrs McNamee & Co., under a special contract.

SPRANCE GATES.

These have undergone a thorough repair. The gates are now in the old position, the aqueduct. The gates may be kept down to the level of the masonry and new work below the surface of the water. A level bed prepared expressly for the purpose. They can remain in that position and will not be protected from the injurious

COST ESTIMATE.

The estimate was accepted and the cost estimate was made by the engineer, Messrs. McNamara & Co.,

of the city of New York, and the buildings before the completion of the buildings except those belonging to the city of New York, and the Water Com-

missioners. The first section of the new aqueduct has been completed, viz. 2 miles, and the first contract, viz. 2 miles, was let to John D. Kelly, Esq., and 3 years ago. But the previously unfinished, this is now being completed by it. It is satisfactory to know that the work is completed, and as to cost, it is within the estimate.

Yours, &c.

Sir,

Yours, &c.

B. D. McCONNELL,
Resident Engineer, New Aqueduct.

PUMPING DEPARTMENT.

January, 10th 1879.

LOUIS LESAGE, ESQ.,

Superintendent Water Works,

Montreal.

SIR,

In obedience to your request, my Report for the year ended 31st December 1878, is respectfully presented.

I have much pleasure in stating that during the past year the working of all the Pumping Machinery was most satisfactory.

BREAST WHEEL.

The Breast Wheel and connections required no other repairs than repairing one of the connecting rod gibs, and one plunger rod, neither do they require any special attention at present, it will however be necessary to renew the main connecting rod Brasses this year.

TURBINE No. 1.

Turbine No. 1 required no repairs during the past year, neither does it require any at present.

TURBINE No. 2.

The first accident that occurred in connection with this Machine since it was first started (July 7th 1874) occurred on the 6th of Sept. last, and consisted in breaking into many pieces the bottom plate of the Shute connecting the Turbine Cylinder with the Flume; it was replaced by a more substantial one, and ready to start again on the 5th following month. The only other repairs required by this Wheel and its connections during the past year, was one new valve spindle and re-bushing one of the pump valves. At present it is in good order.

A new Bevil Wheel was provided and is ready to replace the present one when required.

The Bevil Wheel on the Crank Shaft of the Bilge Pumps was recogged during the past year.

BEAM ENGINES.

As these Engines were not worked during the past year, they required no other attention than packing and cleaning. They are in good order and always ready to meet emergencies.

WORTHINGTON ENGINES.

During the past year, the low pressure Pistons of these Engines were turned and fitted up as recommended in my last year's Report, and all other repairs carried out, they are therefore like all the rest of the Machinery in the highest possible state of efficiency.

BOILERS, &c.

All the Boilers with their Steam and Water connections, received all necessary attention and I need only add that it would be impossible to put them in better order than they are in at present.

BUILDINGS.

All the Buildings (excepting the sheds attached to the Dwellings, the roofs of which require regravelling) are in good order.

A new Bridge is required across the waste weir in front of the Shops, the old one being completely used up.

HEATING.

In my last year's Report I recommended the adoption of Steam instead of Stoves for heating the Works, the necessary change to that effect was carried out last fall with very satisfactory results.

I have the honor to be,

Sir,

Your obedient servant,

T. WALSH, M. E.

BEAVER HALL HILL,

MONTREAL, Dec. 1st, 1878.

L. LESAGE, Esq.

Dear Sir,

I have as instructed by you made a qualitative and partial analysis of the water supplied to my Laboratory here on the dates January 3d, March 5th, July 3d and November 1, of this year for the purpose of comparing the hardness, the organic impurity and the suspended matter at the different seasons, and beg to hand you the following tabulated result.

Water taken	Hardness.	Organic Impurity.	Suspended matter.	Appearance.
January 3d.	3° dark	1°	None.	Bright and white, quite clear.
March 5th.	2° "	1°	Turbid and Brown deposit. 2 grs. per gallon.	Brown tinge and turbid light deposit.
July 3d.	1° "	1½°	Chiefly clay. 0.5 grs. per gallon.	Slight tinge of opal.
November 1.	2° "	1½°	Sand and vegetable decay. 3 grs. per gallon.	Dirty looking but deposit falls in 24 hours.

It will be seen from the above that the spring floods bring down organic coloring matter from the north district, but that the water is soft and good, and the impurity would be removed by filtration through beds of sand and gravel although mere settling beds would be insufficient for this purpose. The suspended impurities in the water, during the latter portion of the fall and during the period of floating ice would be best removed by settling beds, and I think that both methods will be found necessary to meet the varying conditions at different periods of the year.

I am Sir,

Your obedient servant,

J. BAKER EDWARDS,

Public Analyst.

L. LESAGE, ESQ.,

Supt. Water Works,
City Hall.

No. 1—SCHEDULE shewing the Duty of the Turbine Wheels.

MONTHS.	Revolutions Wheel No. 1.	Revolutions. Wheel No. 2.	Total No. of Revolutions.	Number of gallons pumped.	Olive Oil in gallons.	Coal Oil in gallons.	Tallow in pounds.	Coal for Fuel in pounds.
1878								
January.....	442,956	418,533	862,489	165,299,632	40'27	21,52	.....	16,290
February.....	427,609	397,921	825,530	158,525,205	29,72	16,53	.....	14,130
March.....	538,680	504,887	1,043,567	200,235,716	42,22	18,40	.....	12,870
April.....	504,156	460,802	964,958	186,667,044	40,00	16,22	.....	6,975
May.....	503,450	440,434	943,884	182,488,082	41,94	14,97	.....	360
June.....	576,960	500,450	1,077,410	208,498,280	46,94	15,28	.....
July.....	549,176	501,467	1,050,643	202,175,124	50,83	15,50	.....
August.....	534,641	504,778	1,039,419	199,278,497	62,24	17,78	45,00	.....
September.....	485,403	485,403	970,806	198,862,107	40,02	15,59	.....
October.....	547,358	487,287	1,034,645	199,652,890	40,55	20,27	6,00	36,020
November.....	516,727	530,167	1,046,894	198,862,107	43,20	21,83	.....	73,730
December.....	504,362	494,325	998,687	190,676,446	50,39	22,45	.....	98,850
Total.....	6,131,478	5,310,532	11,442,010	2,214,593,110	528,32	216,14	61,00	359,225
Last year.....	5,910,413	2,952,131	8,862,544	1,348,041,617	319,06	150,39	349,00	79,185

No. 2—SCHEDULE shewing the Duty of Breast Wheel.

MONTHS.	Revolutions.	Number of Gallons pumped.	Olive Oil in gallons.	Coal Oil in gallons.	Tallow in pounds.	Coal for Fuel in Pounds.
1878						
January.....	347,986	51,501,928	17,50	21,52	.....	1,400
February.....	21,946	3,248,008	11,66	16,53	.....	1,400
March.....	382,531	56,614,588	16,94	17,78	.....	1,000
April.....	504,872	74,721,056	18,05	11,01	.....	400
May.....	495,745	73,370,260	24,72	15,59	.....
June.....	558,295	82,627,660	21,30	15,28	.....
July.....	494,932	73,249,936	30,83	15,59	.....
August.....	464,976	68,816,448	29,16	18,04	.....
September.....	512,925	75,912,900	15,55	16,84	.....
October.....	575,274	85,140,552	22,77	21,52	.....
November.....	504,184	74,619,232	24,16	21,52	.....	1,100
December.....	427,338	63,246,024	12,61	22,14	.....
Total.....	5,291,004	783,068,592	245,25	213,36	.....	5,300
Last year.....	3,962,128	586,394,944	197,18	146,48	44,00	39,100

No. 3.—SCHEDULE shewing the Duty of Engine No. 3.

MONTHS.	Pumping Time.		Revolutions.	Number of Gallons Pumped During the Month.	Coal consumed for pumping, in pounds.	Banking Piles, in lbs.	Olive Oil in gallons.	Coal Oil in gallons.	Number of pounds of Coal to raise 1 million gallons.	Average Pressure of Water on the Pump pistons.
	H.	M.								
1878.										
January...	219.10	105.999		46,185,044	290,566	68,310	29.04	10.60	7.639	73
February...	323.00	190.517		83,186,212	484,980	43,560	40.77	9.64	6.351	73
March...	80.40	38.341		16,675,076	97,670	21,360	8.60	2.33	7.152	73
April...						1,430	2.49	2.49	.....
May...						1,130	1.51	1.56	.....
June...	9.00	4.738		2,073,616	11,510	2,560	3.22	3.43	6.785	76
July...	154.40	103.231		46,086,616	223,680	18,430	22.16	6.00	5.376	76
August...	184.00	66.746		59,138,820	213,050	9,180	17.22	6.23	5.679	76
September...	268.00	170.209		74,352,924	387,660	18,330	29.93	5.61	5.469	76
October...	51.10	33.923		14,790,428	77,150	8,910	8.16	3.74	5.618	76
November...						3,100	1.94	4.06	.....
December...							4.33	3.43	.....
Total.....	1,261.36	734.961		331,310,636	1,785,050	191,230	169.37	87.61	61.56	

No. 4.—SCHEDULE shewing the duty of High Level Service Engine.

MONTHS.		Engine.		Number of gallons pumped during the month.	Coals consumed for pumping in pounds.	Coals consumed for banking fire in pounds.	Olive Oil in gallons.	No. of pounds of coals to raise 1 million gallons.	Average pressure of water in the pump pistons.
		Running Time.	Revolutions.						
1878		H.M.							
January	.....	215.15	326,989	3,523,868	40,169	8,903	8.20	12,506	50
February	.....	198.30	292,099	3,505,188	35,303	8,525	7.19	12,503	50
March	.....	206.30	287,770	3,453,240	35,179	8,323	6.61	12,589	50
April	.....	224.00	314,803	3,777,636	39,645	8,159	8.41	12,654	50
May	.....	232.00	310,103	3,721,236	39,224	8,759	8.60	12,891	50
June	.....	219.10	304,316	3,651,792	38,417	7,174	8.61	12,484	50
July	.....	280.50	392,657	4,711,884	49,014	8,644	10.94	12,213	50
August	.....	155.00	199,625	2,395,500	25,783	4,341	5.61	12,575	50
September	.....	142.15	202,526	2,430,312	25,050	4,721	5.77	12,249	50
October	.....	181.00	207,257	2,487,084	26,792	7,610	7.75	13,844	50
November	.....	173.15	182,771	2,193,252	25,062	7,631	7.25	14,906	50
December	.....	183.30	183,935	2,207,220	28,016	6,851	8.87	15,796	50
Total	.....	2411.15	3,204,851	38,458,212	407,654	89,662	94.76	12,931	

No. 5.—SCHEDULE shewing the Level of Water and Evaporation at the
McTavish street Reservoir for the year 1878.

MONTHS.	Average monthly depth.	Rain Gauges in inches.				Evaporation in inches.
		Rain.	Snow.	Reduced to rain	Total Rain.	
1878						
January	22.32	.60	21.75	2.54	3.14	1.81
February	22.56	.....	2.10	.29	.29	2.49
March	23.18	.50	10.50	1.13	1.63	2.25
April	22.89	.....	.....	.....	1.62	2.18
May	17.97	.....	.....	.....	2.47	3.39
June	15.09	.....	.....	.....	.78	4.30
July	21.22	.....	.....	.....	4.90	5.03
August	20.83	.....	.....	.....	3.71	3.97
September	19.79	.....	.....	.....	.52	3.34
October	22.33	.....	.....	.....	3.93	2.05
November	22.78	1.70	8.50	2.82	4.52	1.26
December	22.43	2.85	20.75	1.12	3.97	2.03
Total .....	.....	5.65	63.60	7.90	31.48	34.10
Last year .....	.....	15.02	48.55	7.03	22.05	37.82

No. 6.—Number of places where the Corporation plumbers were called
during the winter 1877-78, indicating the number of cases where
the Corporation and the Water Tenants were at fault :

CORPORATION SIDE.		LANDLORDS AND TENANTS' SIDE.	
Service pipes at fault :		Service pipes at fault :	
Choked or other causes	8	Frozen inside	21
Frozen outside	9	“ in the wall	121
		Burst by frost	5
Total	17	Total	147
			17
Grand Total		164	

There has been 329 fire hydrants founds frozen 805 times during
the winter 1877-78.

Leaks on service pipes and their cause during the year ending on the
31st December 1878.

Leaks caused by pipes breaking over drains	98
“ “ worn out pipes	55
“ “ frozen and burst pipes in foundation walls	51
“ “ leaky taps	95
Total	299
Old wooden boxes replaced by iron ones	463

1900

	1900	1901	1902	1903	1904	1905	1906	1907	1908
Total	55,134,894	68,643,672	57,104,296	70,981,628	88,798,761	98,612,897	106,422,600	117,196,133	107,554,112
Daily Average									
for the year.....	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
Increase.....	.....	1,125,732	712,552	232,278	734,670	809,602	675,809	981,044	.....
Decrease.....	224,915	.....	.....	.....	.....	.....	.....	.....	786,749
January	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
February	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
March	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
April	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
May	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
June	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
July	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
August	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
September	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
October	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
November	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512
December	4,591,574	5,720,306	6,432,858	6,085,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512

No. 8. — SCHEDULE shewing the different kind and sizes of Water Meters belonging to the Water Works and to private parties.

KIND.	SIZE IN INCHES	Property of the Water Works.			Total of the Water Works.	Property of Private Parties.			Total of private Parties.	GRAND TOTAL.
		In the City.	Outside of the City.	At the Work Shop.		In the City.	Outside of the City.	At the Work Shop.		
Gem	1	40	.....	36	76	4	.....	2	6	82
"	1	25	1	7	33	6	.....	1	7	40
"	1	8	1	3	12	4	.....	.....	4	16
"	1	8	.....	12	10	4	.....	.....	4	14
"	1	.....	2	1	3	8	.....	.....	8	11
"	3	1	.....	1	2	6	.....	.....	6	8
"	4	6	5	2	13	.....	.....	.....	.....	13
"	6	2	1	.....	3	.....	.....	.....	.....	3
"	10	.....	1	.....	1	.....	.....	.....	.....	1
Union	5	95	3	43	141	8	.....	.....	8	149
"	1	27	.....	3	30	1	.....	.....	1	31
"	2	2	.....	.....	2	1	.....	.....	1	3
"	3	.....	.....	1	1	.....	.....	.....	.....	1
Union Rotary	5	2	.....	.....	2	.....	.....	.....	.....	2
"	1	1	1	.....	2	.....	.....	.....	.....	2
"	3	.....	.....	1	1	1	.....	.....	1	2
"	4	.....	1	1	2	.....	.....	.....	.....	2
Worthington	5	2	.....	2	4	20	.....	.....	20	24
"	1	1	.....	1	2	1	.....	.....	1	3
"	1	.....	.....	.....	.....	1	.....	.....	1	1
"	2	2	.....	.....	2	6	.....	.....	6	8
"	3	.....	.....	.....	.....	.....	1	.....	1	1
Desper	3	1	.....	1	2	.....	.....	.....	.....	2
Maxim	1	.....	.....	1	1	1	.....	.....	1	2
"	1	.....	.....	.....	.....	.....	.....	1	1	1
Anbin	1	.....	.....	1	1	.....	.....	.....	.....	1
Lewis	1	.....	.....	1	1	.....	.....	.....	.....	1
Providence	1	.....	.....	2	2	.....	.....	.....	.....	2
Fairchild	1	.....	.....	1	1	.....	.....	.....	.....	1
Total		223	16	111	350	72	1	4	57	427

No. 9.—SCHEDULE shewing the Pipes, Hydrants, Valves, Services, &c., laid down in the City of Montreal during the year 1878.

NAMES OF STREETS.	LENGTH IN FEET OF CAST IRON PIPES.			No. OF VALVES.			Hydrants.	Brick Chambers.	Houses Supplied.	Length of Lead Pipes in feet.	Brass Stop Cocks.
	6"	4"	Total.	6"	4"	Total.					
<i>East Ward.</i>											
Parthenais	2	56	2
Claude	2	64	2
Total	4	120	4
<i>Center Ward.</i>											
St. James	3	47	3
Fortification Lane	162	162	.....	1	1	.....	1	1	23	1
Total	162	162	.....	1	1	.....	1	4	70	4
<i>West Ward.</i>											
Notre Dame	36	36	.....	2	2	.....	.....	.....	.....	.....
McGill	24	24	.....	1	1	.....	.....	1	25	1
Foundling	5	85	5
St. Peter	2	36	2
Total	60	60	.....	3	3	.....	.....	8	146	8

St. Ann's Ward.

Boigneurs.....	12	12	1	23	1
Britannia.....			1*	4	128
Duke.....				2	34
Magdalen.....				2	55
Young.....				5	58
Ottawa.....				1	27
Centre.....	69	69	1	3	31
Forfar.....			1	3	3
St. Etienne.....				1	9
Longueuil Lane.....				2	20
St. Henry.....				7	156
Congregation.....				1	11
Condé.....				1	18
King.....				6	124
William.....				1	21
Chaboillez Square.....				9	99
Barre.....				10	157
Prince.....				8	93
Shannon.....				7	67
Hunter.....				1	53
Chaboillez.....				1	11
Island.....				4	78
St. Maurice.....				6	111
Mullins.....				1	34
Bourgeois.....	255	12	1	1	25
Queen.....				3	41
College.....					
Eleonor.....					
Total.....	256	93	349	93	1567
			1	3	93

Summary showing the Work Accomplished during the year

Name of Street	Number of Streets		Number of Lots		Number of Lots		Total
	Number of Streets	Number of Lots	Number of Streets	Number of Lots	Number of Streets	Number of Lots	

St. Lawrence Ward

Cheney St.	1	1	1	1	1	1	1
Dorch St.	1	1	1	1	1	1	1
Juror.	1	1	1	1	1	1	1
St. Urbain.	1	1	1	1	1	1	1
St. Alexander.	1	1	1	1	1	1	1
St. Famille.	1	1	1	1	1	1	1
Bleury.	1	1	1	1	1	1	1
St. Lawrence.	1	1	1	1	1	1	1
Anderson.	1	1	1	1	1	1	1
Berthelet.	1	1	1	1	1	1	1
Plateau.	1	1	1	1	1	1	1
Total.	10	10	10	10	10	10	10

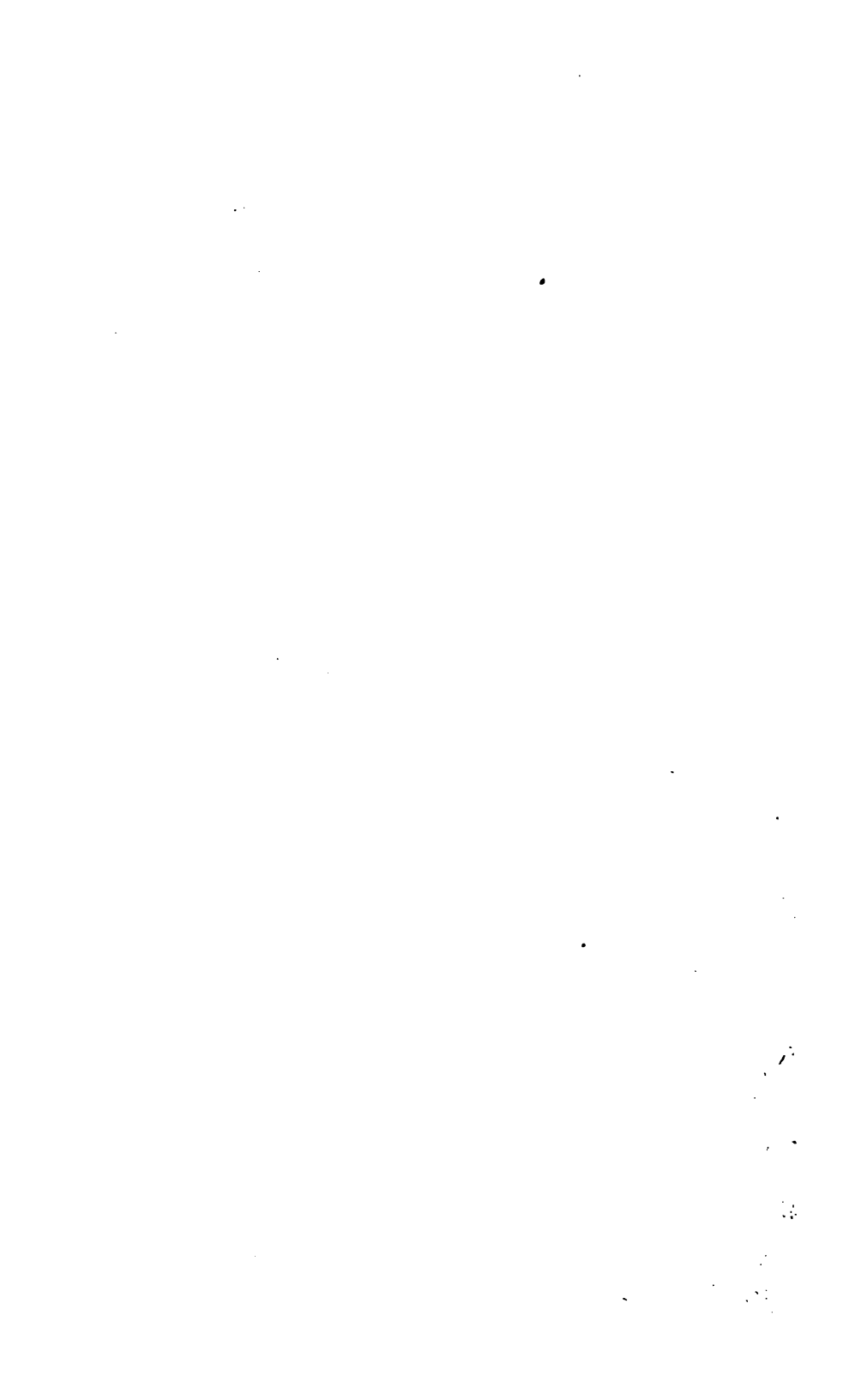
St. Louis Ward.

St. Dominique.	14	14	14	14	14	14	14
St. Lawrence.	74	74	74	74	74	74	74
St. Elizabeth.	180	180	180	180	180	180	180
Craig.	107	107	107	107	107	107	107
Drolet.	1	1	1	1	1	1	1
St. Hypolite.	11	11	11	11	11	11	11

SCHEDULE shewing the Pipes, laid down, &c.—Continued.

NAMES OF STREETS.	LENGTH IN FEET OF CAST IRON PIPES.			NO. OF VALVES.		Hydrants.	Brick (Chambers.	Houses Supplied.	Length of Lead Pipes in feet.	Stop Cocks.	
	12"	6"	4"	Total.	6"						4"	Total.
<i>St. Mary's Ward.</i>											
Panct.											
Ontario								1	35	1	
Lagauchetiere								4	93	4	
St. Catherine								3	69	3	
Shaw								5	105	5	
Seaton								3	193	3	
Bishop Lane								2	66	2	
Dufresne								8	199	7	
Fullum								3	69	3	
Visitation								1	35	1	
Colborne Avenue								1	21	1	
St. Alphonse								1			
Amity			27					4	51	4	
Gain								2	12	2	
Total			27								
Grand Total	7597	1066	993	9656	2	5	7	13	465	11985	405

• These 12" Pipes were laid in 1876-77, but have not been returned.



No. 10.—8-INCHES showing the Pipes, Hydrants and Valves laid down, and the number of Houses supplied with water in the City of Montreal, up to 1st January 1879.

WARDS	LENGTH OF MAIN PIPES IN FEET.										NUMBER OF VALVES.										HYDRANTS.		Houses Supplied.			
																					Public.	Private.				
	30 Inc.	24 Inc.	16 Inc.	12 Inc.	10 Inc.	8 Inc.	6 Inc.	4 Inc.	3 1/2 Inc.	3 1/4 Inc.	Total	30 in	24 in	16 in	12 in	10 in	8 in	6 in	4 in	3 1/2 in	3 1/4 in	Total				
East.....						3270	470	7430	430		890	1849			6	7	22	3			38	30	68	705		
Centre.....						2307	408	6634	8400		856	17058				7	25	2			39	34	73	764		
West.....			630			4379	700	6721	10480	130	430	23426			1	2	11	26	3		48	37	85	737		
St. Ann.....						6292	2657	620	31910	62020		893	114340			1	4	1			1	169	134	289	3128	
St. Antoine.....	1300	140	2020			19616	10720	900	43160	96410	643	1763	179492		2	11	8	3	67	140	11	262	416	4135		
St. Lawrence.....	2113					1719	6562	3250	10876	20137	807	657	69104		3	3	3	21	40		73	150	2601			
St. Louis.....	1710					83	9034	1020	14408	31500	36	588	67078		2	6	1	14	44	6	72	8	133	2009		
St. James.....	2500					180	4776		20363	42456		732	70078		1	2	4	80	67		94	83	173	4573		
St. Mary.....	2906					39	6052		42071	300007	850	221	1208	92878		2	8	48	47	2	108	108	4	213	4379	
Total.....	9906	1000	2650	30904	90482	27000	102018	310002	7250	764	7320	639213	3	2	2	39	72	0	240	403	32	892	786	16	1500	2420
Riding Main.....	12930	26496										41225	623	1	2						34			31	3	
Grand Trunk R. R., Pointe St. Charles.....												6111				2					6		10	15		
Mont. City, P. R. Co., St. Mary str.....												1016									1		1	20		
Military Government at Hochelaga.....												2180									1		1	2		
Old Trunk R. R., St. Bonaventure st.....												645									2		2	4		
Canada Rubber Co., St. Mary street.....												104									1		1	2		
St. Lawrence Glass Works, Bellisle st.....												480									1		1	1		
Anger's Ship Yard Canal Bank.....												127									1		1	2		
Bank of Montreal, Fortification lane.....												47									1		1	1		
Merchants Bank.....												18									1		1	1		
Montreal Teleg. Co., St. Sacrament st.....												18									1		1	1		
Gazette Office, Fortification lane.....												20									1		1	1		
Fisher & Son, Wool factory, Basin at.....												108									1		1	1		
R. Chateleau, 604 street.....												18									1		1	1		
R. Chateleau, Craig street.....												27									1		1	1		
St. George's Church, Stanley street.....												79									1		1	1		
American Church, Drummond street.....												40									1		1	1		
A. Cantin, St. Joseph street.....												120									1		1	1		
Queen's Hall, St. Catherine street.....												28									1		1	1		

[illegible]

No. 11.—SCHEDULE shewing the Monthly Average pressure in the City Mains during the year 1878.

MONTHS.	At Water Works along La- guchière street, cor- ner of St. Charles Borromée.	Central Fire Sta-									
---------	---	---	--	--	--	--	--	--	--	--	--

MANAGEMENT.

No. 12.—STATEMENT shewing the various details of the expenditure in the Montreal Water Works Department during the civic year ending 1st January 1879.

ADMINISTRATION.—

\$ cts. \$ cts. \$ cts.

AQUEDUCT.

Cleaning	2592 60	
Altering 3000 feet fencing.....	243 23	
Repairs to Bridges and Fences...	268 78	
Cleaning Ditches and repairing		
Banks.....	48 94	
Cutting Weeds.....	60 00	
Police Service.....	60 60	
Sundries.....	21 88	
	<hr/>	3296 03

WHEEL HOUSE.

Valve Box... ..	500 00	
1 Bevel Wheel.....	413 36	
Repairs to Buildings.....	25 57	
Works on Ground around the		
Buildings.....	1 88	
Supplies (including fuel for heat-		
ing)	956 69	
Repairs to Machinery.....	363 29	
Sundries.....	101 05	
	<hr/>	2361 84

ENGINE HOUSE.

Repairs to Buildings.....	100 99	
Supplies, Oils, Tallow, &c.....	673 04	
Wages of Men running Engine...	3698 78	
Fuel for Steam.....	3617 53	
Repairs to Machinery.....	136 92	
Sundries.....	107 93	
	<hr/>	8335 19

TAIL RACE.

Repairs.....	90 69	
Keeper's Salary.....	81 00	
	<hr/>	171 69

PIPE TRACK.

Repairs to Valve Chambers, &c... ———	157 46	
Carried forward.....		

MANAGEMENT.

STATEMENT shewing the various details of the expenditure of the Montreal Water Works Department during the civil year ending 1st January 1879.

ESTIMATION.— \$ etc. \$ etc. \$ etc.

EXPENDITURE.

Salaries and Wages	2572 74	
Rent and Fuel	243 23	
Repairs and Expenses	255 74	
Interest on Debt	42 34	
Transportation	44 44	
Stationery	44 44	
Postage	21 50	
Total		3224 48

REVENUE.

License	344 44	
Water	512 34	
Interest	22 32	
Other	1 50	
Total		881 76

BALANCE.

Balance	44 44	
Interest	44 44	
Postage	44 44	
Stationery	44 44	
Transportation	44 44	



	\$	cts.	\$	cts.	\$	
Brought forward.....						
RESERVOIRS.						
McTavish Rep. Valve House and Fences	182	02				
McTavish Fuel and Light.....	64	91				
High Level: $\frac{1}{2}$ of Guardian's Pay..	200	00				
Coteau Barron: Sundries.....	82	20				
					529	13
HYDRANTS.						
Inspecting and keeping in order.					4177	19
PUBLIC FOUNTAINS.						
Repairing, Wages, Materials.....					410	13
DISTRIBUTION PIPES.						
Repairs to Valves, Mains, Servi- ces, &c.....	7133	65				
Thawing Pipes & Carting Water..	298	83				
Inspecting Services inside Houses.	1145	47				
Rep. to Streets and Footpaths....	1118	36				
					9696	31
SHOP DEPARTMENT.						
Wages, Foreman, Clerk, Turn- cocks, Mechanics, Laborers....	5835	74				
Rent, Foreman's House.....	300	00				
Iron, Timber and Spike, &c.....	135	28				
Sundries, Coals & Wood for fuel.	676	14				
Tools	139	05				
Instalment on shop.....	800	00				
					7886	21
Staff					8978	01
MISCELLANEOUS.						
Superintendent's Horse keep....	600	00				
Contingencies.....	155	23				
School Rates and Assessments...	1475	09				
Map for Distribution Pipes.....	669	45				
Damages	394	38				
McConnell, assist. to Mr. Lesage.	300	00				
					3594	15
METER DEPARTMENT.						
Meter Inspectors.....	1314	85				
Testing and Repairs.....	1384	68				
					2699	53
Carried forward.....						19438

	\$	cts.	\$	cts.	\$	cts.
Brought forward.....					19438	66
WORK SHOP AT WHEEL HOUSE.						
Three Mechanic's.	263	93				
Materials, Iron, Copper, Lead, &c	129	66				
Fuel, Light, Sundries.....	38	57				
				431	89	
ENGINE HOUSE AT HIGH LEVEL RESERVOIR.						
Fuel for Engine.....	1336	15				
Oil and Tallow.....	255	00				
Wages to men running Engine...	930	31				
Repairs to House.....	23	75				
Do Machinery and sundries..	124	97				
				2670	18	
REBUILDING PORTION OF WALL AT MCTAVISH RESERVOIR...						
				654	75	56049 66
LOANS.						
PIPE LAYING.						
Cast Iron Pipes.....	853	53				
Lead Pipes and Tin.....	476	00				
Special Castings.....	450	36				
Brass.....	210	30				
Planks	76	43				
Wages	14534	85				
Bricks and Drain Pipes.....	63	26				
Cement and Lime.....	87	33				
Coals	61	80				
Iron Service Boxes.....	3135	83				
Iron	200	69				
Tools, &c.....	32	70				
Packing	22	95				
Sundries.....	117	68				
Meters	1885	42				
Atwater Avenue, 24" main.....	598	55				
Sundry ac. charged to P. L. for which warrants were made in 1877 but which were paid only in 1878.....	735	95				
				23543	63	
New Cut 1st Section.....				54408	18	
Extension of McTavish Reservoir				12460	26	90412 07
Grand Total.....						\$146461 73

SCHEDULE No. 13.

TABLE shewing the position of Public Fountains erected in the City of Montreal up to 1879.

	Cast Iron Basins.	Stone & Cement Basins.	Number of Jets.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cast Iron Watering places.	
1 Papineau Square.....			1			1	1	
2 St. Catherine & Papineau Road.....			1			1	1	
3 Dalhousie Square.....			1				1	
4 Vigor Square, Basin No. 1.....	1		1					
5 do do No. 2.....	1		2			1		
6 do.....			2	1		1		
7 Bonsecours Market.....			2			2		
8 Jacque-Cartier Place.....	1		4		1		1	
9 Court House do.....	2	2	5	2				
10 Charlevoix & St. Lawrence.....			1			1	1	
11 Place d'Armes.....	2	1	5		4			
12 Custom House Place.....	2	1	1					
13 St. Ann's Market.....			2			2		
14 Bleury & Dorchester.....			1	1				
15 Victoria Square, south side.....		1	9	2				
16 do north side.....	3		4					
17 Craig & Victoria Square.....			1	1			3	Stone.
18 Beaver Hall Square.....			2		1			
19 Phillips Square.....			1			1		
20 do & St. Catherine.....			1				1	
21 Common & Gray Nuns.....			1			1	1	
22 Hay Market, Collège street.....			1			1	1	
23 Chabillier Square.....			1				1	
24 Sherbrooke, near Drummond.....			1			1	1	Stone.
25 Richmond Square.....		2	2					
26 St. Antoine Market.....			1			1	1	
27 Seigneurs & Basin.....			1			1	1	
28 Mill.....			1				1	
29 Wellington & St. Patrick.....			1			1	1	
30 St. Gabriel Market.....			2			1	1	Wood.
31 Papineau R. near Rim of the City.....			1				1	
32 Ontario & St. Denis.....			1			1	1	
33 Sherbrooke & Guy.....			1			1	1	
34 Vigor Market.....			6			2	6	
35 Dorchester & Visitation.....			1			1		
36 Opposite Jacques-Cartier wharf.....			1	1				
37 St. Thomas & Ottawa.....			1			1	1	
38 Opposite Allan wharf.....			1					
39 Opposite the Island wharf.....			1					
40 Opposite LaRoix street.....			1	1			1	
41 McTavish street, at Reservoir.....			1		1			
Total.....	10	8	87	11	7	24	29	

No. 14—INVENTORY OF STOCK ON HAND, JANUARY 1879.

	30"	24"	16"	12"	10"	8"	6"	4"	3"
Cast Iron Pipes in feet...	1500	1356	528	2376	1386	1080	28818	29682	.....
Sleeves.....	34	48	7	21	16	30	13	12	16
Elbows.....				8	9		12	18	.....
Double Bends.....							8	3	.....
Flaps.....	2	5	4	31	14	15	20	30	4
Caps.....	1		4	18	8	4	75	15	12
Valves.....	2	4	2	4	4	5	17	12	3

			30x30	30x24	24x24	12x10		10x10	6x6	12x12
Two branch Pipes.....			4	2	4	3		5	6	2
	30x24	24x16	16x12	12x10	12x6	10x8	10x6	8x6	6x4	4x3
Taper Pipes.....	10	3	1	4	5	1	7	1	5	7

	30x24	30x12	30x6	30x4	12x12	12x10	12x8	12x6	12x4	10x10	10x8	10x6	10x4	8x8	8x6	8x4	6x6	6x4	4x4	4x3
Cross Branches	2	3	2	1	14	11	3	13	6	6	5	10	7	6	18	6	12	14	23	6
Single Branches	6	1	9	7	4	8	12	4		6	8	12	1	21	17	14				

BRASS WORKS.

200	1	inch	Coupling	Cocks.
138	1	"	Nozles.	
116	1	"	x $\frac{5}{8}$ 3 way	Teos.
269	$\frac{5}{8}$	"	Nozles.	
250	$\frac{5}{8}$	"	Cocks.	
559	$\frac{5}{8}$	"	Union	Couplings.
171	$\frac{5}{8}$	"	Crosses.	
177	$\frac{5}{8}$	"	3 Way.	
162	$\frac{1}{2}$	"	Coupling	Cocks.
1460	$\frac{1}{2}$	"	Nozles.	
265	$\frac{1}{2}$	"	Union	Couplings.
162	$1\frac{1}{2}$	"	Stop	Cocks.
2	2	feet	Peet	Valve.
6	$1\frac{1}{2}$	inch	Couplings.	
30	$\frac{3}{4}$	"	"	
19	$\frac{1}{2}$	"	"	
1	2	"	Cocks	for iron Pipes.
3	$\frac{3}{4}$	"	"	"
3	1	"	"	"
60			Hydrant	Nozles.

LEAD PIPES AND OTHER LEAD.

37000	lbs.	1	inch	Lead	Pipes.
1000	"	$\frac{1}{2}$	"	"	
18000	"	$\frac{1}{2}$	"	"	
6430	"			Pig	Lead.
244	"			Block	Zinc.
443	"			"	Tin.
440	"			Ingot	Copper.
50	"			Copper.	

No. 15.—TABLE shewing the number of Assessed Dwellings, Stores, Shops, Offices, Warehouses, Manufactories, Hotels, &c., in the City of Montreal, for the year 1878—1879, with the Assessed Water Rates thereon

DWELLINGS

Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
3506	2978	528	\$5.00	25648	23623	2025	\$32.75
4144	3779	365	5.75	201	191	10	34.25
3598	3400	198	6.50	17	17	....	35.00
3079	2918	161	7.25	1	1	5	35.75
1943	1847	96	8.00	21	16	2	36.50
1437	1353	84	8.75	56	54	....	37.25
751	697	54	9.50	35	35	....	38.00
1595	1499	96	10.25	3	3	....	38.75
92	85	7	11.00	7	7	....	40.25
1060	963	97	11.75	174	161	13	41.75
56	48	8	12.50	4	4	....	43.25
722	656	66	13.25	4	4	....	44.00
153	139	14	14.00	35	35	....	44.75
605	550	55	14.75	15	15	....	47.75
18	17	1	15.50	107	106	1	49.25
441	397	44	16.25	2	2	....	51.50
8	8	....	17.00	6	6	....	55.25
654	598	56	17.75	50	50	....	56.75
3	3	....	18.50	3	3	....	59.00
253	232	21	19.25	4	4	....	62.75
6	6	....	20.00	69	66	3	64.25
312	294	18	20.75	3	3	....	66.50
34	30	4	21.50	2	2	....	67.25
165	159	6	22.25	1	1	....	70.25
9	9	....	23.00	33	30	....	77.75
155	151	4	23.75	22	22	....	85.25
1	1	....	24.50	1	1	....	92.75
350	330	20	25.25	5	5	....	100.25
143	135	8	26.75	1	1	....	107.75
94	93	1	28.25	2	2	....	115.25
27	24	3	29.00	3	3	....	122.75
204	195	9	29.75	1	1	....	137.75
2	2	....	30.50	1	0	1	152.75
28	27	1	31.25	1	1	....
25648	23623	2025		26538	24475	2063	

SCHEDULE shewing the number of Assessed Dwellings, &c.—*Cont.*

STORES, SHOPS, OFFICES, &c.

Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rat	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
450	431	19	4 00	4464	4078	386		5027	4589	438	
504	467	37	5 00	70	65	5	30 00	9	9	....	102 00
1012	931	81	6 00	9	9	....	31 00	2	2	....	110 00
218	203	15	7 00	13	13	....	32 00	5	5	....	114 00
327	291	36	8 00	85	72	13	34 00	8	8	....	122 00
118	107	11	9 00	52	45	7	38 00	5	5	....	130 00
521	521	60	10 00	3	3	....	39 00	1	1	....	138 00
18	18	....	11 00	77	69	8	42 00	4	3	1	142 00
197	169	28	12 00	1	1	....	44 00	2	2	....	146 00
26	24	2	13 00	32	31	1	46 00	4	4	....	162 00
302	273	29	14 00	62	55	7	50 00	1	1	....	182 00
7	7	....	15 00	15	15	....	54 00	1	1	....	202 00
95	88	7	16 00	2	1	1	55 00	1	1	....	222 00
28	24	4	17 60	14	13	1	58 00	1	1	....	226 00
214	190	24	18 00	2	2	....	60 00	1	1	....	234 00
2	2	....	19 00	22	17	5	62 00	4	3	1	242 00
37	35	2	20 00	32	31	1	66 00	2	2	....	258 00
4	4	....	21 00	5	5	....	70 00	3	3	....	282 00
147	130	17	22 00	23	22	1	74 00	1	1	....	306 00
20	20	....	24 00	1	1	....	78 00	1	1	....	322 00
6	6	....	25 00	24	23	1	82 00	1	1	....	402 00
142	128	14	26 00	2	2	....	89 00	1	1	....	442 00
8	8	....	28 00	9	8	1	90 00	1	1	....	562 00
1	1	....	29 00	2	2	....	94 00	1	1	....	722 00
				6	6	....	98 00	1	1	....	802 00
4464	4078	386		5027	4589	438		5088	4648	440	

SCHEDULE showing the number of Dwellings, &c.—(Continued.)

HOTELS AND TAVERNS.

Number assessed.	Tenant- ed.	Vacant and not supplied.	Yearly Rate.	Number assessed	Tenant- ed.	Vacant and not supplied.	Yearly Rate.
103	103	.....	\$12 00	308	308	.....	\$62 00
58	58	.....	17.00	3	3	.....	72.00
72	72	.....	22.00	1	1	.....	82.00
25	25	.....	27.00	1	1	.....	92.00
28	28	.....	32.00	2	2	.....	122.00
9	9	.....	37.00	1	1	.....	142.00
9	9	.....	42.00	1	1	.....	202.00
4	4	.....	52.00	1	1	.....	352.00
308	308			321	321		

HORSES.		COWS.		STALLS.		URINALS.		WATER CLOSETS.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
2908	\$2.00	625	\$1.00	569	\$1.00	516	\$1.00	315	\$2.00
				222	2.00	75	1.50	376	3.00
						17	15.00	6472	4.00
								19	15.00
2908		625		791		608		7182	

SPECIAL RATES.

BAKERIES.		BEER BOTTLERS.		FOUNTAINS.		FACTORIES.		STEAM ENGINES.		Total.	SUNDRIES.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Horse Power.		No.	Rate.
9	\$5.00	9	\$5.00	25	\$5.00	1	\$8.00	5	1	5	2	\$ 5.00
1	6.00	1	10.00	2	6.00	4	10.00	12	2	24	3	6 00
1	7.00	1	15.00	1	8.00	2	15.00	13	3	39	2	15.00
1	9.00	1	24.00	1	9.00	2	20.00	17	4	68	1	17.00
4	10.00	1	30.00	2	10.00	1	22.50	11	5	55	1	20.00
5	12.00			1	12.00	1	25.00	21	6	126	1	24.00
6	15.00			2	15.00	1	27.00	2	7	14	1	33.00
11	20.00					3	30.00	5	8	40	2	50.00
1	21.00					1	35.00	2	9	18	1	600.00
1	25.00					1	60.00	6	10	60	1	750.00
1	30.00					1	90.00	2	12	24		
1	35.00							1	15	15		
2	40.00							2	18	32		
1	45.00							1	18	18		
								5	20	100		
								1	25	25		
45		13		34		18		106		663	13	

RECAPITULATION.

	Tenanted.	Vacants.	Total.
Dwellings...	24475	2063	26538
Stores, Shops, Offices	4648	440	5088
Hotels and Taverns.....	321	.....	321
	<hr/> 29444	<hr/> 2503	<hr/> 31947
Steam Engines			106
Special charges on Manufactories, &c.....			123
Horse Stalls.....			791
Water Closets.....			7182
Urinals.....			608
Horses.....			2908
Cows			625

No. 16.—CASH RECEIPTS BY THE WATER DEPARTMENT,

During civic year ending 31st December 1878.

For dwellings, shops, offices and hotels.....	\$269744	87
“ Water Closets.....	25151	00
“ Urinals.....	814	50
“ Horses	4974	00
“ Cows	547	00
“ Horse Stalls.....	920	00
“ Steam Engine.....	4480	00
“ Permits for Hoses to Water Streets, &c.....	700	00
“ “ for Building purposes.....	959	98
“ Private Fountains	216	00
“ Manufactories, &c	2474	00
“ Water supplied through meters outside City limits.....	\$4591	12
“ Water supplied through meters within City limits.....	25324	56
	<hr/>	<hr/> 29955 64
“ Rent of meters outside City limits.....	453	08
“ “ “ inside “	950	70
	<hr/>	<hr/> 1403 78
	<hr/>	<hr/> \$342341 27
Miscellaneous.....	3395	97
Costs	154	59
	<hr/>	<hr/> 345891 83
Less refunded.....		910 58
		<hr/> \$344981 25

CHS. LAPIERRE, Sec. M. W. W.

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ANNUAL REPORT

OF THE
SUPERINTENDENT

OF THE

MONTREAL WATER WORKS

FOR THE

YEAR ENDING 31st DECEMBER, 1879.

Printed by Order of the Water Committee.



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ANNUAL REPORT

OF THE

SUPERINTENDENT OF THE MONTREAL WATER WORKS,

FOR THE YEAR ENDING DECEMBER 31ST, 1879.

To the Mayor, Aldermen and Citizens of the City of Montreal.

GENTLEMEN,—I have the honor to submit to you my report of the proceedings of the Water Department for the year 1879.

AQUEDUCT.

The completion of the cleaning of the Aqueduct as proposed, at the beginning of the year, had to be postponed, the requisite funds not having been granted. This work should be resumed and carried through this next summer. Several repairs to banks, fences, bridges and ditches were done during last summer.

The regulating Gates on the New Cut, having become obstructed by sunken drift wood, and branches, brought in from the river during the spring freshets, were restored to their usefulness with considerable trouble. Divers had to be employed to remove the obstructions. A new apparatus consisting of toothed quadrants and tangent screws, was permanently attached to the spindles of the valves, giving more power for opening and shutting them.

In order to prevent as much as possible a recurrence of these difficulties, it was recommended that a boom made of square timber, should be placed in the river, across the entrance of the Still Water Basin. The money for this

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work having been granted late in the fall, the beam has been made ready for use for next spring, when it will be in time for the object sought.

At the Junction of the New Cut with the old Aqueduct, a portion of the old bank which had been washed off by the surface water, was re-made, of greater width, and to such a height as to prevent any overflow in future.

Several of the Farm Bridges require considerable repairs, and one must be entirely renewed. These bridges are built of wood and their life is about ten years. Since the opening of the Aqueduct in 1856 all of them, that is eleven, have been renewed once, and in a year or two they must be again renewed.

I would recommend that in future they be built of iron. The facilities for the manufacture of iron structures of this description are now so great, that their economy over wooden ones, in the long run, is very considerable. The first cost of an iron bridge is about double that of a wooden one, and the former will last four times the latter.

A portion of the original fencing alongside the Aqueduct is much in need of repairs, and should be converted into plain picket fences. The old material should be used over again, as was done in most of the fencing already altered. This alteration gives the fence greater stability than the original one.

The Keeper's house is in a dilapidated condition and should be rebuilt near the new Regulating Gates, as being more convenient for attending the gates, and saving thereby the employment of an additional hand.

PUMPING WORKS.

The pumping machinery is now of a nominal capacity of 24 millions of imperial gallons per twenty-four hours, as follows, Water Wheels and Pumps 10 millions of gallons, that is, Turbine No 1 with two pumps of 4 millions of gallons capacity. Turbine No. 2 with three pumps of 3 millions of gallons capacity.

One Breast Wheel with three pumps of 3 millions of gallons.

Steam Engines and pumps 14 millions of gallons per twenty-four hours, that is,

Engine No. 1 with two pumps of 3 millions of gallons capacity.

Engine No. 2 also with two pumps of 3 millions of gallons capacity.

Engine No. 3 (Worthington) with two pumps of 8 millions of gallons capacity.

The whole of this machinery is in as good condition as can be expected under the circumstances, and has received that care and attention due to the importance of the work it has to perform, as may be seen from the report (hereto appended) of Mr. Walsh the mechanical Engineer.

With this large pumping capacity it might naturally be inferred, that the City, (whose daily consumption averages only a little over 9 millions of gallons) is well secured for some years to come against a deficiency of supply, from inadequate pumping machinery. But further enquiry will serve to prove such inference erroneous.

As stated in my last year's report, some of the water power machinery, particularly the pumps of Turbine No. 2 and of the Breast Wheel, have been in use since 1856, nearly 24 years, and may be expected to give way soon, as the pumps are leaky and much worn.

This state of affairs has induced me to urge your Water Committee to recommend the erection of a new set of pumps and a new Turbine Wheel alongside of Turbine No. 2.

On my suggestion the Water Committee has ordered me to prepare plans, specifications and estimates for this work. I hope these will soon be laid before you for approval.

By the help of this proposed addition to the machinery, the old pumps could, when condemned, be removed and new ones substituted, without any diminution in the water supply.

As to the Steam Pumping Machinery (which however is only to be regarded as auxiliary to the water power) the Worthington Engine is the only one that can be safely relied upon. The others Nos. 1 and 2 (always kept as they are in working order) might be of great service in a moment of emergency, but have not so far been judged reliable where steam power alone might be required.

By the addition of the Worthington Engine, the Steam Power has been rendered ample for years to come, as a supplement to the deficient winter water power of the Aqueduct, at the same time making less imperative, the immediate continuation of the "Inland Cut" to the Wheel House.

The buildings have been kept in repair, but some of the roofs, particularly those over the boiler house, and of the coal shed require renewing. Over the boiler house I would recommend a metallic roof instead of a felt one as at present.

Schedules Nos. 1 and 2 in the appendix show the quantity of water pumped during the year by the water wheels, as follows :

Turbine No. 1 worked 8112½ hours and pumped 1,326,991,857 gallons.			
Do	No. 2	" 7917 "	" 1,818,629,440 "
The Breast Wheel		" 7600½ "	" 865,123,820 "
Forming a total of.....			3,010,750,117 "

The expenses of repairs and administration as per detailed statement of schedule No. 12 amounts to \$1750.36 for raising 3,010,750,117 gallons. 165 feet high or \$0.0035 per million of gallons raised one foot high.

The quantity of water pumped by Steam as per schedule No. 3 is as follows :

Engine No. 3 worked 1532 hours and pumped 340,714,250 gallons and the expenditure under this head as per detailed statement in schedule No. 12 is \$5,946.57 or \$0.106 nearly per million of gallons raised one foot high.

Cost of raising one million of gallons one foot high.

In.	By water power.	By Steam power.
1875	\$0.02	\$0.119
1876	0.014	0.144
1877	0.0158	0.080
1878	0.0106	0.170
1879	0.0035	0.106
Average of 5 years.	0 0127	0.124

The finishing shop at the Wheel House has proved as usual a good adjunct to the large and costly amount of machinery located there, numerous repairs being, in all such cases, inevitable. All the brass work for the Department, as well as the finishing of the new valves, hydrants, &c., as enumerated below, has been done there, viz :

31 New Fire Hydrants.

38 Cast Iron Valves.

28 Plates, Quadrants, worm Wheels, &c., for Regulating Gates.

280 Ragged Bolts and Bolts and Nuts $1\frac{1}{2}$ for Boom.

324 Brass Stop Cocks.

16 Brass Spindles for Valves.

Besides a large quantity of Bolts, Nuts, Couplings, Crank handles, &c.

TAIL RACE.

With the exception of some trifling repairs to fences, nothing has been done to this portion of the works.

In consequence of the lowering of the water in the Tail Race it has not been possible to supply the requisite quantity of water to the St. Pierre River, at the overflow provided for that purpose. This brought complaints from the neighbouring proprietors, and the matter was remedied by the introduction of a syphon pipe through the Aqueduct banks. This way of getting over the difficulty is however only temporary, and some more effective and permanent means must be adopted, such for instance as lowering the overflow, and deepening the bed of the St. Pierre.—

Several lots of land along the line of the Tail Race have been rented, viz, one on the River shore at the mouth of the Tail Race to the Grand Trunk Boating Club. Another on the west side of the Tail Race along the Lower Lachine Road to Mr. Lepeintaur, a third on the East side of the Tail Race to Mr. M. Hennessey. The want of a man to keep in repair the ditches and fences along the Tail Race and around the Wheel House, has been felt. Any person appointed to that duty, should be invested with the power of a special constable, that he might maintain the peace, and put a stop to the disorders which are of too frequent occurrence on the grounds near the Wheel House.

PIPE TRACK.

The line of the Pipe Track or Pumping Mains is in good condition, all the necessary repairs having been done. All the large valves, with one exception have been kept in good order. The exception is that at the junction of the 30 inch and 24 inch mains on Atwater Avenue near St. Joseph Street. This valve will require a new spindle as soon as a favourable opportunity for making the change offers.

The repairs to the brick tunnel on Atwater Avenue at Dorchester Street, which were undertaken in, 76 and discontinued for want of funds should be completed as soon as possible. A large portion of the brick work has been damaged by frost, and unless soon repaired, there is danger that the tunnel may collapse.

There are now three lines of pumping mains connecting the pumping works with the McTavish Street Reservoir and with the City mains, viz: two 24 inch and one 30 inch with duplicates under the Lachine Canal. Their combined capacity is sufficient for the delivery of twenty millions of gallons per 24 hours.

RESERVOIRS.

The McTavish Street Reservoir is now completed. The sodding of the banks, and the making of water courses,

were completed during last Summer. A cobble stone water course has been laid all along the side of the roadway around the Reservoir bank, a neat iron wire railing has also been put up on the edge of the top of the slope of the embankment in front of the Reservoir. All the cast iron and wire railings have received a new coat of paint. A wooden railing has been erected along the top of dry wall on the Eastern side of the roadway towards Pine Avenue.

It is expected that this portion of the Water Works will not require any further expenditure for a considerable time.

The Upper Level Reservoir at the head of Peel Street has been kept in good condition and no repairs have been done to it.

The Coteau Baron Reservoir having been transferred to the Road Department, as being useless for Water Works purposes, has been partially filled up, and will be utilized as a pond for the amusement of the public.

HIGH LEVEL SERVICE.

The small pumping engine, at the McTavish Street Reservoir, for the high level service, has been performing its work during the whole year with regularity, and the water supply has been constant in the upper levels, without any material repairs to the Engine or Engine House. Every thing is in good order and works well.

Schedule No. 4 shows that the Engine has worked 2756 hours and has pumped 38,181,204 gallons 220 feet high with an expenditure of \$2,362.20 or 28 $\frac{1}{4}$ cents per million of gallons raised 1 foot high.

Cost of raising one million of gallons 1 foot high

in 1876.....	\$0.24
" 1877.....	0.25 $\frac{1}{4}$
" 1878.....	0.35 $\frac{1}{2}$
" 1879.....	0.28 $\frac{1}{4}$

DISTRIBUTION AND SERVICE PIPES.

The quantity of Distribution and Service Pipes laid during the year has been very small, viz. 631 lineal feet of 30 inch lineal feet of 4 inch cast iron pipes, with 12 of 2 inch, twelve 4 inch, and one 3 inch. 17 fire hydrants have also been laid and 311 valves, the whole as shown on schedule No. 7.

The length of cast iron pipes laid in the City up to the 31st Dec 1885 lineal feet of 30 inch, 27,666 feet of 24 inch, 32,578 feet of 12 inch, 66,682 feet of 8 inch, 196,192 feet of 6 inch, 329,519 feet of 4 inch, 182 feet of 3 inch and 7,135 feet of small pipes making a total of 695,440 lineal feet or nearly 13 miles.

There have been laid 9 valves of 30 inches, 25 of 24 inches, 10 of 12, 74 of 10, 9 of 8, 247 of 6, 542 of 4, 12 of 3 and 2 of 2 inches, or a total of 983 valves. There are 25,134 hydrants including 37 private ones, and 25,134 valves supplied with water; the whole as shown in schedule No. 7.

Repairs have been done to the distribution pipes, stop valves and fire hydrants.

Schedule No. 6 shows that there have been 72 leaks on the distribution pipes, of which 24 were broken pipes, and 48 were leaking at the joints. 9 old hydrants have been removed and new ones substituted. The hydrants have had new valves.

There have been 394 leaks on the lead service pipes, 100 of which were caused by people excavating near the pipes and various other causes. 572 wooden service pipes were taken up and iron ones substituted for them.

The fire engines were called out 490 times for frozen pipes, most of which cases arose from cold cellars. The Department, tho' not responsible for the expense in attending to and examining the pipes, has received a great number of complaints from tenants. 128 Fire

hydrants have been found frozen 835 times, averaging $6\frac{1}{2}$ times each. Some of these found frozen so often have received special attention this year, so as to protect them more effectually. The new Fire Hydrants now used by the Department are so constructed that few of them have been found frozen. As the old hydrants are removed and replaced by the new ones the chances of freezing will diminish. The customary inspection of hydrants has been continued during the year, as also the inspection from house to house to detect waste.

CONSUMPTION OF WATER.

The amount of water pumped during the year has been 3,351,464,367 gallons making an average daily consumption of 9,177,504 gallons, that is 86,373 gallons more than that of 1878 as shown in schedule No. 7.

The amount furnished to outside municipalities is 23,560,566 gallons. For flushing sewers and flooding rinks 908,700 gallons. For fires 2,211,300. For watering the streets 27,711,680.

The small increase in the quantity of water consumed shows that the waste is kept within reasonable bounds. This result is largely attributable to greater care on the part of tenants in looking after the condition of their water fixtures as well as to the careful inspection by the Department, of all premises where water is used.

The water meter system, which is now in force in all Hotels, Railway yards and Stations, and all Manufacturing establishments where much water is used, has also contributed to check the waste.

WATER METERS.

The number of water meters now in use is 297, of which 227 belong to the City and 70 to private parties. Besides these there are on hand at the water works shop 175, making a total of 472. A good many of the meters at the shop are out of repair, whilst the remainder is kept in reserve for future use. In connection with this branch of

the Department I have to remark that a change in the water tariff by meter measurement, would be a great improvement. It would consist to fix the tariff of rates on the number of cubic feet instead of on the number of gallons as it now exist. This change would save the inconvenience of converting the reading of the quantity of water which is recorded in cubic feet by the meter, into gallons, which by the present mode entails a good deal of labor in making the water accounts.

WATER WORKS SHOP IN THE CITY.

The shop on Lagauchetière Street is in the same lamentable condition it was in last year. A few repairs were made to the dwelling of the guardian.

A suitable building in which to carry on the work of the Department is much needed. The old buildings which were in existence when the Corporation acquired the property, were then converted into workshops. They are now so much out of repair, besides being so entirely unsuitable for workshops, in plan and general arrangement, that it would be injudicious to incur the large outlay necessary to put them in order.

At the present moment there is much need of a proper place in which to test and repair water meters, which have now become an important part of the plant of the Department. The building of suitable apparatus for this purpose will necessitate a considerable outlay, and it is desirable that the other workshops should at the same time be remodelled and the whole put in one commodious building, by which means a better supervision could be exercised and stricter economy and order maintained.

ADMINISTRATION.

The administration of the Department although not so heavy as in previous years, when large works of construction were carried on, has nevertheless been the object of a good deal of care, particularly as to minor details, which could not previously have been so well attended

to on account of press of office work. With the help of my Deputy Mr. McConnell I have been able to introduce a good many reforms tending towards economy, and I am happy to report that for a few years past the cost of administration has decreased considerably. This last year it amounted to the sum of \$52,005. The previous year it was \$56,049. In 1877 it was \$65,598, showing continual decrease since 1876.

During the past year a new survey of all the stop valves and cocks laid in the city, has been made and recorded with all their proper measurements; in the shape of a guide book, which is to take the place of a similar one printed ten years ago, and now becoming useless on account of the many improvements since effected in the distribution pipes.

The plans showing the positions of the pipes, hydrants and stop cocks, have also been progressing.

I have to mention that the Water Committee under whose directions I have been working, has given assiduous attention to the business of the Department, thereby rendering my duty a good deal less difficult, and I thank them for the confidence they have reposed in me.

I remain Gentlemen,

LOUIS LESAGE,
Supt. of W. W.

APPENDIX.

MONTREAL, FEB. 11th 1880.

LOUIS LESAGE, ESQ.,

*Superintendent Water Works,
Montreal.*

SIR,

My report on the working of my department during the year 1879, is respectfully presented, and shows the amount of repairs carried out in connection with machinery, &c. during that time.

BREAST WHEEL.

The Breast Wheel, pumps, &c., are in their usual good order. The connecting rods were provided with new brasses, as recommended in my last year's report, and one new Bucket Follower replace one broke on 28th April.

On the 15th of November last one half of a tooth was broken out of the Crank Shaft Pinion and as I believe it to be the result of some hard substance passing through rather than that of natural working strain, I entertain no fear for its safety.

TURBINE No. 1.

The only repairs required by this portion of the machinery during the past year was to recog the Bevil Wheel, the old one having given way on the 11th of August, and on the 30th of the same month was ready to start again.

The bearing at one end of the counter shaft which had already on a previous occasion been cutting in its brass was again cut to such an extent as to require returning and the brass to be renewed. Should this occur again, I believe the only remedy will be to provide for a new shaft.

A new guide plate was put in the Turbine to replace one damaged by drift wood. I would recommend that the split pump cylinder held together by hoops, be replaced by a new one.

TURBINE No. 2.

The only repairs worth naming in connection with this machine, was renewing one pair of Brasses and one Gib, in one of the connecting rods; it may however be found necessary to replace the Bevil Wheel by one kept in readiness.

BEAM ENGINES.

As these engines did not work during the past year I have nothing to report about them, other than they are kept clean and in the best possible working order for emergencies.

DUPLEX ENGINES.

Apart from remaking some of the joints, taken down for examination, and renewing 26 valve springs, these engines required no special attention, although there is a slight escape of steam past one of the high pressure pistons, it is not enough to warrant me in recommending taking it out for refitting.

BILGE PUMPS.

I would recommend that the Bilge Pumps, in the pump pit, which were always an intolerable nuisance be replaced by a centrifugal.

BOILERS.

All the Boilers and connections are in excellent order, they required no repairs during the last year other than

at usual attendance in maintaining joints on the steam and water pipes, and keeping everything clean.

BUILDINGS.

The Wheel and Engine Houses are in good order, the gutters of the roofs received two coats of paint, and all necessary repairs were duly carried out during the year.

BOILER HOUSES.

The old Boiler House is in good order, the roof of which received two coats of paint. The upper structure is a new one which under the influence of heat acting on timber was sinking and seriously threatening safety, was made perfectly safe by supporting the runways on four cast iron columns resting on cast iron girders. The roof which is covered with a composition known as Plastic Slate admits the weather in many places. I would therefore recommend that the present covering be replaced by Canada plate and painted as are all the other roofs excepting that of the Coal Shed which is covered with felt only, and from the fact that it admits and retains moisture for a long time, it is injurious to the roof.

I would recommend that it be covered with Tar and paper in the usual way.

DWELLINGS.

Each of the Dwellings were treated to one coat of white wash and some minor repairs carried out last year.

As these Buildings received but little attention since they were built about 14 years ago, they will require some attention for repairs to floors, windows, doors, fastenings, &c.

During the past year the roofs of the Sheds were covered with three plies of felt pitch and gravel, I would call your attention to the fact that sometimes through the leakage of the main drain from the privies the excrements flow into the collars, thereby endangering the lives of the

occupants of said dwellings in which there already occurred seven cases and four deaths from diphtheria. I therefore request that you will (as soon as possible) cause the following sanitary changes to be effected, i. e.

Sever the connections between the cellars and privies, and cause a special drain to be laid in rear of the Sheds, and facilitate flushing of the pits by introducing into each a small pipe with the necessary stop cocks to be at pleasure connected or disconnected with the service pipe in each cellar.

GROUNDS.

Except planting a few trees and repairing the slope on the tunnel, making a new stair in front of the Engine House, and a new bridge over the waste weir, nothing was done in the way of embellishing the surroundings during the past year. The railing connecting with the balustrade crossing the Tail Race and the Foundry require renewing.

I have much pleasure in congratulating you on the result of your labour in bringing under the notice of the Water Committee the actually existing necessity of increasing our pumping facilities by the addition of another turbine and pumps, &c., for which I am now preparing plans and specifications.

In conclusion I must inform you that on several occasions the premises were fired by peat burning locomotives passing on the G. T. line.

I have the honor to be,

Sir,

Yours always,

THOS. WALSH, M. E.

No. 2 — SCHEDULE showing the Duty of Breast Wheel.

MONTHS.	Revolutions.	Number of Gallons pumped.	Olive Oil in gallons.	Castor oil in gallons.	Machinery Oil in gallons.	Coal Oil in gallons.	Tallow in pounds.	Coal for Fuel in Pounds.
1879								
January.....	530,108	78,455,984	11.79	.....	.....	21.64	.....	1,500
February.....	292,403	43,275,614	8.72	.....	.....	15.74	.....	400
March.....	2,798	414,104	5.28	.....	.....	14.47	.....	.....
April.....	531,408	78,648,384	2.09	.....	.....	13.90	32.00	.....
May.....	569,228	84,245,744	1.52	.....	8.22	13.53	.....	.....
June.....	549,899	81,385,052	.....	1.54	8.62	9.74	39.00	.....
July.....	607,450	89,902,600	.....	1.94	.....	12.59	.....	.....
August.....	592,217	87,648,116	.....	6.03	.....	12.53	29.00	.....
September.....	589,175	87,197,900	.....	5.13	.....	16.60	.....	.....
October.....	555,031	82,144,588	.....	6.17	.....	21.09	.....	.....
November.....	501,375	74,203,500	.....	4.60	.....	21.09	21.00	.....
December.....	524,373	77,607,204	.....	2.67	.....	22.67	.....	.....
Total.....	5,845,465	885,128,820	29.40	30.75	16.84	195.59	121.00	1,900
Last year.....	5,291,004	783,068,592	245.25	.....	.....	213.36	44.00	5,300

Defining the Duty of the Turbine Wholesaler

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	2991	2992	2993	2994	2995	2996	2997	2998	2999	3000
1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				

No. 4.—SCHEDULE shewing the duty of High Level Service Engine.

MONTHS.	Engine.		Number of gallons pumped during the month.	Coals consumed for pumping in pounds.	(Coals consumed for blanking fires in pounds.	Olive Oil in gallons.	No. of pounds of coals to raise 1 million gallons.	Average pressure of water on the pump pistons.
	Running Time.	Revolutions.						
1879								
January.....	H.M. 201.00	184.833	2,218.056	29,033	6,634	1.27	13,089	50
February.....	184.35	200.353	2,404.236	29,350	5,341	1.01	12,207	50
March.....	193.50	204.923	2,459.076	28,736	5,971	1.58	11,684	50
April.....	203.15	200.597	2,407.164	27,886	5,383	1.07	10,753	50
May.....	266.45	299.793	3,597.516	39,012	6,066	1.46	11,122	50
June.....	259.15	300.372	3,604.464	38,738	4,819	.....	10,741	50
July.....	286.55	370.201	4,442.412	46,088	5,416	1.48	10,715	50
August.....	236.15	310.337	3,724.014	37,054	4,727	1.16	9,949	50
September.....	252.30	322.584	3,871.008	40,586	5,228	1.52	10,484	50
October.....	259.50	327.459	3,929.508	41,683	4,300	1.78	10,607	50
November.....	183.35	220.483	2,615.796	29,498	5,019	0.59	11,145	50
December.....	228.00	239.827	2,877.924	34,784	6,561	1.24	12,086	50
Total... ..	2755.45	3,131.762	34,181.204	422,418	65,515	37.12	134,612	

Level of Water and Evaporation at the
 in Lake Street Reservoir for the year 1879.

Average monthly depth.	Rain Gauges in inches.				Evaporation in inches.
	Rain.	Snow.	Reduced to rain	Total Rain.	
12.30	.....	32.00	2.94	2.94	2.24
11.47	.....	16.75	.....	1.46	1.44
11.73	.20	19.00	1.76	1.96	2.05
11.37	.27	5.00	.67	.67	2.26
11.15	.59	.....	.....	.59	4.04
11.97	.....	.....	.....	3.34	3.59
11.07	.....	.....	.....	3.99	5.04
11.35	.....	.....	.....	1.42	4.08
11.35	.....	.....	.....	2.66	2.92
11.47	.....	.....	.....	1.39	2.79
11.70	2.25	.11	.25	3.61	1.91
11.20	1.20	.19 $\frac{1}{2}$	1.00	1.60	1.76
.....	4.51	73.05 $\frac{1}{2}$	6.62	25.63	34.12
.....	5.65	63.60	7.90	31.48	34.10

No. 6.—Number of places where the Corporation plumbers were called during the winter of 1878-79, indicating the number of cases where the Corporation and the Water Tenants were default.

CORPORATION SIDE.		LANDLORDS AND TENANTS' SIDE.	
Service pipes at fault	0	Frozen inside	19 places
Frozen outside	7	“ in wall.....	434 times
		Burst by frost.....	30 places
Total.....	7	Total.....	483
			?
		Grand Total.....	490

Repairs done by Work Shop Department during the year 1879.

REPAIRS TO MAINS.

Sizes of Mains.....	12 inch	10 inch	6 inch	4 inch	3 inch
Number of broken mains....	.....	.....	6	17	1
Do points blown out..	8	9	9	22	

REPAIRS TO SERVICES.

Broken Stop Cocks renewed.....	73
Leaks on Couplings	104
Pipes broken over drain (services)....	72
Pipes broken in wall	43
Pipes broken from the other causes (services).....	102
Rotten wooden boxes replaced by iron ones	572
Total	968

Hydrants, Hydrant Valves, Main Valves and Spindles renewed.

Sizes of Valves.....	12 in.	10 in.	8 in.	6 in.	4 in.		
Number of Valves.....	1	1	1	7	17		
Do Spindles	1	.....	.....	3	13		
Do Hydrants .....	.....	.....	.....	.....	.....	9	
Do Hydrant Vaves .....	.....	.....	.....	.....	.....		109

Hydrants frozen 128.....835 times.

Fig. 7.—COMPARATIVE TABLE showing the Daily Consumption for each Month, from 1870 to 1879, in the City of Montreal.

Day/ Average.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
January	5,390,715	5,667,8174	5,974,840	7,290,852	7,095,486	8,384,570	8,657,415	8,657,415	8,657,415	8,657,415
February	4,082,132	6,108,120	5,449,747	7,063,017	7,869,775	8,772,379	9,390,014	9,390,014	9,390,014	9,390,014
March	3,428,207	6,485,962	4,900,149	7,012,675	7,714,778	8,618,153	10,510,001	11,401,111	11,401,111	11,401,111
April	5,475,387	6,356,588	8,064,601	7,279,311	8,110,637	8,677,975	9,511,005	11,401,111	11,401,111	11,401,111
May	5,881,214	6,559,613	7,282,758	6,833,600	7,523,392	8,819,082	9,606,715	10,000,000	10,000,000	10,000,000
June	6,397,578	6,569,112	7,392,330	7,865,951	7,449,288	9,743,053	9,730,109	9,730,109	9,730,109	9,730,109
July	6,717,105	6,814,104	7,643,349	7,785,051	9,039,122	9,301,089	10,527,199	10,527,199	10,527,199	10,527,199
August	6,984,834	7,142,800	6,543,069	8,563,739	9,452,456	8,301,080	10,000,011	10,000,011	10,000,011	10,000,011
September	6,518,369	6,780,880	7,224,962	7,055,885	8,995,613	9,065,770	10,029,001	10,029,001	10,029,001	10,029,001
October	5,837,973	6,547,957	6,615,049	9,168,172	8,561,262	8,614,050	10,111,065	10,111,065	10,111,065	10,111,065
November	6,117,534	6,046,708	6,268,247	6,862,111	7,974,388	8,821,986	9,995,219	9,995,219	9,995,219	9,995,219
December	6,012,224	6,104,278	6,622,527	7,017,387	8,495,810	8,517,777	8,570,611	8,570,611	8,570,611	8,570,611
Total	68,613,672	77,191,296	79,981,628	88,798,751	98,512,897	105,422,600	117,195,133	123,107,551	123,107,551	123,107,551
Daily Average for the year... Increase	5,720,306 1,125,732	6,432,858 712,552	6,665,136 232,278	7,399,806 734,670	8,209,408 809,602	8,785,217 575,809	9,766,261 981,044	8,979,512 789,749	9,991,131 111,619	9,175,504 80,373

No. 8. — SCHEDULE showing the different kinds and sizes of Water Meters belonging to the Water Works and to private parties.

KIND.	SIZE IN INCHES	Property of the Water Works.			Total of the Water Works.	Property of Private Parties.			GRAND TOTAL.
		In the City	Outside of the City	At the Work Shop		In the City	Outside of the City	At the Work Shop	
Gem	10		1		1				1
"	6	2	1		3				3
"	4	6	5	2	13				13
"	3	2			2	6			8
"	2		2	1	3	8			11
"	1½	9		1	10	6			16
"	1	7		5	12	4			16
"	¾	20	1	13	34	6		1	41
"	½	17		58	75	4		2	81
Union	3			1	1				1
"	2	2			2	1			3
"	1	26		5	31	1			32
"	¾	81	3	56	140	7		1	148
Rotary Union...	4	1	1		2				2
"	3			1	1	1			2
"	1½	2		3	5				5
"	1	1	1		2				2
"	¾	17		1	18				18
"	½	1		1	2				2
Crown	1	9	1	2	12				12
"	¾	3		4	7				7
Worthington...	3						1		1
"	2	2			2	6			8
"	1½					1			1
"	1	1		1	2				3
"	¾	2		2	4	17		3	24
Walsh	¾			1	1				1
Barton	¾			1	1				1
Desper	¾			1	1				1
"	¾			1	1				1
Maxim	1							1	1
"	¾			1	1				1
Providence	¾			2	2				2
Fairchild	¾			1	1				1
Aubin	¾			1	1				1
Lewis	¾			1	1				1
Total.....		211	16	167	394	69		8	472

No. 9.—SCHEDULE showing the Pipes, Hydrants, Valves, Services, &c., laid down in the City of Montreal during the year 1879

NAMES OF STREETS.	LENGTH IN FT. OF CAST-IRON PIPES.		No. of VALVES.					Hydrants.	Brick Chambers.	Houses Supplied.	Length of Lead Pipes in feet.	Stop Cocks.
	6"	4"	Total.	10"	6"	4"	3"						Total.
<i>East Ward.</i>												
Notre Dame.....										2	55	2
St. Paul.....										2	55	2
Perthuis										1	12	1
Total										5	122	5
<i>West Ward.</i>												
St. Peter										2	30	2
St. Eloi	225	225				1		1		2	31	2
St. Paul										1	27	1
McGill	23	23								4	137	4
Total	248	248				1		1	1	9	225	9

St. Ann's Ward.

<i>St. Ann's Ward.</i>					
Selgnoirs.....	.....	.....	.....	.....	.....
Murray .....	.....	.....	.....	.....	6 189 6
Farm.....	.....	.....	.....	.....	9 158 9
Wellington .....	.....	.....	.....	.....	.....
Grand Trunk.....	15	15	.....	.....	.....
St. Patrick	14	14	.....	.....	.....
Forfar .....	.....	.....	.....	.....	.....
Mullins.....	.....	.....	.....	.....	.....
Congregation.....	221	221	.....	.....	.....
Conde	21	11	.....	.....	.....
William .....	.....	.....	.....	.....	.....
Magdalen	11	11	.....	.....	.....
Prince .....	.....	.....	.....	.....	.....
St. Joseph.....	.....	.....	.....	.....	.....
St. Ann's.....	.....	.....	.....	.....	.....
Sebastopol	54	54	.....	.....	.....
St. Anns	200	200	.....	.....	.....
Richmond	54	54	.....	.....	.....
Inspector .....	.....	.....	.....	.....	.....
Young	34	31	.....	.....	.....
College .....	.....	.....	.....	.....	.....
Eleonor.....	9	9	.....	.....	.....
Richardson.....	3	3	.....	.....	.....
Ollier	27	27	.....	.....	.....
Ottawa .....	.....	.....	.....	.....	.....
St. Thomas.....	.....	.....	.....	.....	.....
McCord .....	.....	.....	.....	.....	.....
Guy	324	324	.....	.....	.....
Mensl	252	252	.....	.....	.....
Dalhousie.....	.....	.....	.....	.....	.....
Favard .....	.....	.....	.....	.....	.....
Centre .....	.....	.....	.....	.....	.....
Total.....	1229	1229	.....	.....	.....

No. 3.—SCUDLER showing the Duty of Engine No. 3.

MONTHS.	Pumping Time.		Revolutions.	Number of Gallons Pumped During the Month.	Coal consumed for pumping, in pounds.	Coal consumed for Banking Fires, in lbs.	Olive Oil in gallons.	Castor Oil in gallons.	Coal Oil in gallons.	Number of pounds of Coal to raise 1 million gallons.	Average Pressure of Water on the Pump pistons.
	H.	M.									
1879.											
January....	28.00		12,298	5,584,100	26,470	3,660	3.37	.....	4.13	5,343	73
February....	163.26		98,762	44,338,400	268,710	27,460	22.90	.....	3.46	5,835	74
March....	615.25		254,637	114,695,650	639,570	14,700	69.12	.....	13.85	5,493	72
April....	143.50		67,355	30,309,750	181,070	21,720	16.85	1.64	3.87	5,314	73
May....	47.15		30,306	13,692,700	65,640	8,680	4.29	.....	1.62	5,123	74
June....	18.45		9,971	4,486,950	23,290	4,130	1.29	.....	1.26	5,191	70
July....	38.10		24,214	10,896,800	58,430	9,770	1.22	1.04	3.00	5,362	74
August....	410.05		212,980	95,841,000	503,170	13,340	33.00	2.81	8.46	5,231	72
September....	28.30		19,398	8,729,100	43,860	5,320	3.00	.....	1.00	4,966	75
October....	35.55		21,499	9,674,550	49,700	8,550	2.91	.....	2.00	5,143	73
November....	9.45		6,035	2,713,750	16,940	1,980	1.00	.....	3.63	6,239	75
December....									4.62		
Total....	1,532.05		757,865	340,714,250	1,853,410	119,620	126.95	5.99	50.90	4,770	

SCHEDULE showing the Pipes, laid down, &c.—Continued.

NAMES OF STREETS.	LENGTH IN FT. OF CAST IRON PIPES		No. of VALVES.				Hydants.	Brick Chimneys.	Houses Supplied.	Length of Lead Pipes in Feet.	Brass Stop Cocks.	
	6"	4"	Total.	10"	6"	No. of VALVES.						
						4"						3"	Total.
<i>St. Lawrence Ward—Cont.</i>												
Brought forward.....	147		147			1		1	8	207	8	
Anderson									1	22	1	
St. Phillips									1	29	1	
Arade									1	32	1	
Ontario									5	101	5	
Total	147	147	147			1		1	16	391	16	
<i>St. Louis Ward.</i>												
St. Dominique												
St. Lawrence	9	9	9					1	2	41	2	
St. Elizabeth	72	72	72					2	6	88	6	
St. Denis	18	153	171	1	1	1	2		1	27	1	
Ontario									4	111	4	
Mignonne									4	78	4	
Drolet									6	122	6	
St. Hypolite									2	38	2	
Caillioux									7	199	7	
Piard	162	162	162						6	308	6	
St. Constant	18	18	18					1				
Sanguinet	5	5	5					1				
St. Louis									1			
Total	18	419	437	1	1	1	3	5	3	1012	38	

St. James Ward.

[illegible]

St. Mary's Ward.

	No.	%	Total
Ontario .....	.....	.....	.....
Fallum .....	.....	.....	.....
Champlain .....	.....	.....	.....
Parthenais	0 0	1	.....
Lacachetière .....	.....	.....	.....
Mignonne	222 222	1	.....
Shaw .....	.....	.....	.....
Total	231 231	2	18 421 18

No. 10.—SCHEDULE showing the Pipes, Hydrants and Valves laid down, and the number of Houses supplied with water in the City of Montreal, up to 1st January 1880.

[illegible]

No. 11.—SCHEDULE showing the Monthly Average pressure in the City Mains during the year 1879.

MONTHS.	At Water Works along Levee, opposite street corner of St. Charles Borromée.	Central Fire Station									
		No. 2, St. Gabriel Street.	No. 3, Wellington St.	No. 4, Chaboille St.	No. 5, St. Catharine Street.	No. 6, Ontario Street.	No. 7, Dalhousie Sqr.	No. 8, Craig St.	No. 9, Centre St.	No. 10, St. Catharine Street.	No. 11, Ontario Street.
1879											
January.....	64.00	50.00	75.00	74.00	45.00	59.00	58.00	72.00	.....	25.00	58.00
February.....	63.00	51.00	75.00	74.00	45.00	59.00	59.00	72.00	.....	25.00	57.00
March.....	61.00	52.00	75.00	74.00	45.00	59.00	58.00	72.00	.....	26.00	57.00
April.....	65.00	51.00	75.00	73.00	50.00	60.00	56.00	71.00	.....	28.00	58.00
May.....	63.00	51.00	75.00	74.00	50.00	60.00	56.00	71.00	66.00	27.00	57.00
June.....	65.00	51.00	75.00	74.00	50.00	60.00	55.00	66.00	70.00	29.00	58.00
July.....	64.00	50.00	75.00	71.00	50.00	60.00	54.00	67.00	69.00	30.00	57.00
August.....	65.00	49.00	75.00	71.00	.....	.....	53.00	.....	70.00	25.00	58.00
September.....	.....	49.00	75.00	.....	50.00	60.00	.....	.....	68.00	28.00	.....
October.....	.....	50.00	75.00	73.00	50.00	60.00	60.00	69.00	72.00	26.00	62.00
November.....	.....	52.00	75.00	75.00	50.00	.....	60.00	60.00	73.00	28.00	60.00
December.....	.....	52.00	75.00	75.00	50.00	60.00	60.00	71.00	68.00	26.00	60.00
Average 1879....	64.00	50.00	75.00	73.00	49.00	59.00	57.00	69.00	70.00	27.00	53.00
" 1878....	65.00	47.50	75.00	72.41	46.75	57.50	53.08	70.00	70.33	27.33	57.09

No 10.—Schedule showing the Pipes, Hydrants and Valves laid down, and the number of Houses supplied with water in the City of Montreal, up to 1st January 1880.

WARDS	LENGTH OF MAIN PIPES IN FEET.													NUMBER OF VALVES.												Hydrants.	Brick Chambers.	Houses Supplied.
	30 in.	24 in.	16 in.	12 in.	10 in.	8 in.	6 in.	4 in.	3 in.	1½ in.	Lead.	Total.	30 in.	24 in.	16 in.	12 in.	10 in.	8 in.	6 in.	4 in.	3 in.	2½ in.	Total.	Public.	Private.			
East.....	.....	.....	.....	.....	3270	470	6070	7420	430	.....	380	18048	.....	.....	.....	.....	.....	.....	7	22	3	35	30	.....	66	710
Center.....	.....	.....	.....	.....	2900	408	6634	8480	.....	.....	850	17968	.....	.....	.....	.....	.....	.....	7	25	2	39	34	2	63	564
West.....	.....	.....	630	605	4379	706	5721	10728	120	.....	430	23673	.....	.....	.....	.....	.....	.....	11	27	3	49	38	.....	77	746
St. Ann's.....	.....	.....	.....	.....	8292	2697	620	31510	53257	.....	693	115369	.....	.....	.....	.....	.....	.....	10	28	1	45	87	1	172	14610
St. Antoine.....	1360	1060	2020	.....	19616	10720	900	45503	98304	.....	843	1315	181441	1	2	118	9	58	145	.....	11	248	215	.....	423	8197
St. Lawrence.....	2113	.....	.....	.....	1719	5562	3250	15876	29274	800	622	59116	.....	.....	.....	.....	.....	.....	3	3	21	50	.....	5	85	73
St. Louis.....	1710	.....	.....	.....	83	8034	1620	14426	32018	39	236	58153	.....	.....	.....	.....	.....	.....	2	7	1	14	45	1	75	90
St. James.....	2600	.....	.....	.....	190	4778	.....	25633	43407	.....	402	76120	.....	.....	.....	.....	.....	.....	2	4	.....	31	57	.....	95	89
St. Mary.....	2065	39	6632	42871	39118	800	221	1293	98109	1	2	8	48	47	2	108	
.....	9808	1060	2650	30904	66882	7908	133544	321011	2236	764	6371	642598	3	2	9	39	74	9	242	305	132	909	825	16	1616	25431	
Rising Main.....	12030	26000	15	41326	623	1	2	2	34	31	3	
Private.....	2063	8508	146	11317	3	37	40	21	34	
Total.....	22736	27686	2650	39276	66682	7908	196122	5290510	2380	764	6371	6005440	926	3	41	74	9	247	542	132	953	826	87	1681	25434			

No. 11.—SCIENTIFIC showing the Monthly Average pressure in the City Mains during the year 1879.

MONTHS.	At Water works, Legionaires street, cor- ner of St. Charles Borromée.	Central	Fire Sta- tion	Fire Sta- tion	Fire Sta- tion	Fire Sta- tion	Fire Sta- tion	Fire Sta- tion	Fire Sta- tion	Fire Sta- tion	Fire Sta- tion
		Fire Sta- tion	No. 2, St. Gabriel Street.	No. 3, Wellington St.	No. 4, Chaboil- lez Sq.	No. 5, St. Cathrine Street.	No. 6, Ontario Street.	No. 7, Dalhousie Sqr.	No. 8, Craig St.	No. 9, Centre St.	No. 10, St. Cathrine St.	No. 11, Ontario Street.
1879											
January.....	64.00	74.00	75.00	74.00	45.00	59.00	58.00	72.00	.....	25.00	58.00
February.....	65.00	74.00	75.00	74.00	45.00	59.00	59.00	72.00	.....	25.00	57.00
March.....	64.00	74.00	75.00	74.00	45.00	59.00	58.00	72.00	.....	26.00	57.00
April.....	65.00	.....	75.00	73.00	50.00	60.00	56.00	71.00	.....	28.00	58.00
May.....	63.00	70.00	75.00	74.00	50.00	60.00	56.00	71.00	66.00	27.00	57.00
June.....	65.00	70.00	75.00	74.00	50.00	60.00	55.00	66.00	70.00	29.00	58.00
July.....	64.00	70.00	75.00	71.00	50.00	60.00	54.00	67.00	69.00	30.00	57.00
August.....	65.00	70.00	75.00	71.00	.....	.....	53.00	.....	70.00	25.00	58.00
September.....	65.00	.....	75.00	.....	50.00	60.00	.....	.....	68.00	24.00	.....
October.....	.....	.....	75.00	73.00	50.00	60.00	60.00	68.00	72.00	26.00	62.00
November.....	.....	.....	75.00	75.00	50.00	.....	60.00	60.00	73.00	28.00	60.00
December.....	.....	.....	75.00	75.00	50.00	60.00	60.00	71.00	68.00	26.00	60.00
Average 1879.....	64.00	71.00	75.00	73.00	49.00	59.00	57.00	69.00	70.00	27.00	53.00
" 1878.....	65.00	72.00	75.00	72.41	46.75	57.50	53.08	70.00	70.33	27.33	57.09

MANAGEMENT.

No. 12.—STATEMENT showing the various details of the
in the Montreal Water Works Department during
ending 1st January 1880.

ADMINISTRATION.—

\$ cts. \$

AQUEDUCT.

Fixing regulating gates at "Inland Cut."	714 57	
Removing stone from the river bank in front of the "King's Post Farm," to the Corporation property	48 10	
Cleaning ditches all along the line.	766 09	
Repairs to bridges.....	158 62	
do fences	128 47	
Temporary care taker of "Inland Cut."	365 35	
Cleaning of Aqueduct.....	38 8.	
Cutting weeds.....	100 0	
Sundries.....	24 0	

WHEEL HOUSE.

Repairs to machinery.....	270	
do buildings.....	220	
do ground around build'gs.	35	
Supplies, oil, tallow, &c.	70	
Sundries.....		

ENGINE HOUSE.

Repairs to buildings.....		
do machinery.....		
Supplies, oil, tallow, &c.		
Coal for steam.....		
Wages running engine.....		
Rent.....		

TAIL RACE.

Repairs to fences and banks...		
Police services, and taking care of the Corporation property around the Wheel House		

1893
5200

Carried forward

	\$	cts.	\$	cts.	\$	cts.
Brought forward.....					10174	00
PIPE TRACK.						
Repairs to valves and valves Chambers.....			165	73		
RESERVOIRS.						
McTavish, repairs to valve house, fences, banks, &c.....	291	15				
McTavish, fuel and light.....	98	39				
High Level, guardian's pay.. ..	200	00				
do repairs to valve house.	7	44				
Coteau Barron, Repairs to fences, grounds, &c.....	234	54				
			831	52		
HYDRANTS.						
Inspecting	1924	24				
Repairing	2672	00				
Thawing	313	47				
			4909	71		
PUBLIC FOUNTAINS.						
Repairing, wages and material.....			632	18		
DISTRIBUTION PIPES.						
Repairs to mains, services and valves, wages	6874	77				
Thawing pipes and carting water...	338	94				
Inspecting service pipes inside of houses.....	890	95				
Repairs to footpaths and service boxes, wages.	862	59				
Materials, iron castings, lead, tin, &c.	132	51				
do wood, planks, nails, &c...	220	57				
do brick, cement, sand, &c...	171	37				
Clothing for house inspectors	80	00				
			9571	70		
WORK SHOP ON LAGAUCHETIERE STREET.						
Wages, foreman, clerk, turncocks, mechanics, laborers and carters.	4978	00				
Instalment on premises.....	800	00				
Iron, spikes, nails, tin, lead, &c....	367	16				
Timber, wood, coal oil, lamps, &c.	17	69				
Tools, pails, drinking cups, &c....	341	66				
Rent of foreman's house.....	160	00				
Sundries	122	33				
			6786	84		
					28897	68
Carried forward.....					33071	68

Fountains erected in the City
1880.

[illegible]

No. 14—INVENTORY OF STOCK ON HAND, JANUARY 1880.

DESCRIPTION.	30 ⁱⁿ	24 ⁱⁿ	16 ⁱⁿ	12 ⁱⁿ	10 ⁱⁿ	8 ⁱⁿ	6 ⁱⁿ	4 ⁱⁿ	3 ⁱⁿ
Cast Iron Pipes in feet...	1988	1519	522	3432	567	1098	28197	27450	216
do Sleeves or slip sockets	20	39	6	18	17	28	3	11	12
do Elbows				10	9		10	9	
do Plugs	6	5	4	31	16	16	16	11	4
do Caps or Bonnets	1		4	19	12	3	14	9	12
do Stop Valves	2	1	2	4	6	8	25	14	3
do Double Bends							6	5	

	30x30	30x24	24x24	12x10	10x10	16x12	12x6	10x8	10x6	8x6	6x4	4x3
Fork Pipes.....	4	2	4	1	1							
Taper do		9		4		3	3	4	5	6	4	3

	30x24	30x12	30x6	30x4	24x4	12x12	12x10	12x8	12x6	12x4	10x10	10x8	10x6	10x4	8x8	8x6	6x6	6x4	4x4	4x3
Cross pipes.	2	3	2	1	.....	14	11	4	14	5	8	5	11	6	6	18	6	15	14	23
Tee do	6	.....	.....	.....	1	10	8	.....	10	6	5	3	11	3	12	5	10	15	5	1

INVENTORY.—*Continued.*

Cast iron Hydrant Posts.....	47	Cast iron Drinking troughs....	2
“ “ Frames.....	18	Iron tubing 1 inch... 3539 L. ft.	
“ “ Covers	46	Iron rods for service boxes... 150	
“ Valves covers.....	19	Assorted steel.....	6050 lbs.
“ Hydrant seats.....	68	“ iron.....	2010 “
Fire Hydrants.....	16		

BRASS WORKS.

2 inch Cocks	5	$\frac{5}{8}$ “ four way.....	150
$1\frac{1}{2}$ “ “	15	1 “ union couplings....	283
1 “ “	177	$\frac{3}{4}$ “ “ “	28
$\frac{3}{4}$ “ “	6	$\frac{5}{8}$ “ “ “	55
$\frac{1}{2}$ “ “	167	$\frac{1}{2}$ “ “ “	271
$\frac{1}{4}$ “ “	116	Caps for boxes	381
$1\frac{1}{2}$ “ Nozels.....	14	Assorted valve spindles.....	79
1 “ “	138	Hydrant valve seats.....	8
$\frac{5}{8}$ “ “	189	“ nozels.....	56
$\frac{1}{2}$ “ “	1412	1 brass fire hydrant 2 nozels	
$1\frac{1}{2}$ “ three way.....	116	Brass couplings for street	
$\frac{5}{8}$ “ “	209	watering	420
		Iron “ “ “ ...	100

LEAD WORKS.

Pig lead.....	56883 lbs.	$\frac{5}{8}$ inch lead pipes.....	7989 lbs.
1 inch lead pipes.....	21471 “	$\frac{1}{2}$ “ “	12726 “

SUNDRIES.

Valve stones	16	Tile drain pipe 4 inch...111 L. ft.	
Service stones.....	318		

No. 15.—TABLE shewing the number of Assessed Dwellings, Stores, Shops, Offices, Warehouses, Manufactories, Hotels, &c., in the City of Montreal, for the year 1879—1880, with the Assessed Water Rates thereon

D WELLINGS.

Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
3910	3635	275	\$5.00	25146	24053	1393	
4344	4128	216	5.75	19	19	10	\$31.25
3459	3306	153	6.50	205	195	....	32.75
2945	2838	107	7.25	6	6	....	34.25
1677	1598	79	8.00	10	10	1	35.75
1650	1568	82	8.75	28	27	4	36.50
566	523	43	9.50	22	18	....	37.25
1805	1728	77	10.25	2	2	5	38.75
100	78	22	11.00	130	125	....	40.25
911	852	59	11.75	2	2	....	41.75
30	30	....	12.50	2	2	2	43.25
679	641	38	13.25	17	45	....	44.00
136	120	16	14.00	1	1	....	44.75
547	507	40	14.75	1	1	2	45.50
15	15	....	15.50	70	68	....	47.75
415	378	37	16.25	2	2	....	49.25
3	3	....	17.00	14	14	....	51.50
542	552	30	17.75	2	2	1	53.00
160	116	14	19.25	49	48	....	55.25
1	1	....	20.00	15	15	....	59.00
323	306	17	20.75	3	3	3	60.50
27	22	5	21.50	55	52	....	62.75
240	219	21	22.25	1	1	....	64.25
8	8	....	23.00	3	3	....	66.50
149	134	15	23.75	15	15	....	70.25
386	376	10	25.25	14	14	....	77.75
2	2	....	26.00	2	2	....	85.25
123	113	10	26.75	6	6	....	92.75
61	51	10	28.25	1	1	....	107.75
43	37	6	29.00	1	1	....	117.50
146	135	11	29.75	2	2	....	122.75
3	3	....	30.50	1	1	....	152.75
25146	24053	1393		26177	24756	1421	

SCHEDULE shewing the number of Assessed Dwellings, &c.—*Cont.*

STORES, SHOPS, OFFICES, &c.

Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
481	458	23	4 00	4381	3968	413		4821	4372	449	
560	531	29	5 00	8	8		31 00	2	2		110 00
967	862	105	6 00	17	15	2	32 00	4	4		114 00
205	192	13	7 00	1	1		33 00	4	4		122 00
312	279	33	8 00	85	72	13	34 00	1	1		128 00
137	127	10	9 00	3	3		36 00	3	3		130 00
506	454	52	10 00	39	36	3	38 00	2	2		138 00
20	19	1	11 00	1	1		39 00	4	4		142 00
186	163	23	12 00	2	2		40 00	1	1		150 00
41	39	2	13 00	2	2		41 00	2	2		162 00
273	235	38	14 00	75	65	10	42 00	1	1		182 00
9	0		15 00	21	21		46 00	1	1		186 00
77	70	7	16 00	44	42	2	50 00	1	1		194 00
25	21	4	17 00	10	9	1	54 00	4	4		202 00
176	153	23	18 00	24	23	1	58 00	4	4		242 00
2	2		19 00	3	3		60 00	2	2		258 00
44	44		20 00	16	14	2	62 00	1	1		262 00
4	4		21 00	22	21	1	66 00	1	1		274 00
143	117	26	22 00	5	5		70 00	1	1		282 00
1	1		23 00	15	15		74 00	1	1		322 00
27	27		24 00	21	21		82 00	1	1		342 00
6	6		25 00	6	6		90 00	1	1		402 00
117	94	23	26 00	4	4		94 00	1	1		542 00
8	8		28 00	12	11	1	98 00	1	1		642 00
54	53	1	30 00	4	4		102 00	1	1		742 00
4341	3968	413		4821	4372	449		4866	4417	449	

SCHEDULE showing the number of Dwellings, &c.—(Continued.)

HOTELS AND TAVERNS.

Number assessed.	Tenant- ed.	Vacant and not supplied.	Yearly Rate.	Number assessed.	Tenant- ed.	Vacant and not supplied.	Yearly Rate.
116	116	.....	\$12 00	315	315	.....	\$52 00
53	53	.....	17.00	4	4	.....	62.00
69	69	.....	22.00	3	3	.....	72.00
29	29	.....	27.00	1	1	.....	82.00
22	22	.....	32.00	2	2	.....	92.00
10	10	.....	37.00	2	2	.....	122.00
19	10	.....	42.00	1	1	.....	272.00
315	315	.....		329	329	.....

HOUSES		COWS		STALLS.		URINALS.		WATER CLOSETS	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
2384	\$2 00	493	\$1.00	443	\$1.00	473	\$1.00	242	\$2.00
				229	2 00	78	1.50.	338	3.00
						24	15.00.	6605	4.00
								35	15.00
2384		493		742		575		7220	

SPECIAL RATES.

BARBERS.		BEER BOTTLERS.		FOUNTAINS		FACTORIES.		STEAM ENGINEER.			SUNDRIES.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Horse Power.	Total.	No.	Rate.
1	\$4 00	8	\$5.00	18	\$5.00	1	\$3 00	5	1	5	5	\$ 5.00
1	5.00	2	10.00	1	6.00	3	10.00	17	2	34	1	6 00
1	8.00	1	15.00	1	7.00	2	15.00	14	3	42	1	10.00
1	7.00	1	24.00	1	8.00	1	17.00	16	4	64	1	15.00
1	9.00	1	30.00	1	9.00	2	20.00	11	5	55	1	20.00
4	10.00			3	10.00	1	22.50	17	6	102	1	33.00
5	12.00			1	12.00	2	30.00	3	7	21	2	50.00
11	15.00			2	15.00	1	35.00	4	8	32	1	600.00
	20.00					1	90.00	1	9	9	1	750.00
1	21.00							4	10	40		
1	25.00							2	12	24		
2	30.00							1	15	15		
								1	18	18		
								4	20	80		
								1	25	25		
								1	40	40		
47		18		28		14		102		606	14	

RECAPITULATION.

	Tenanted.	Vacants.	Vacant not assessed.	Total.
Dwellings.....	24756	1421	} 885	27062
Stores, shops, offices.....	4417	449		4866
Hotels and Taverns	329	.....		329
	29502	1870	885	32257
Steam Engines.....				102
Special charges on Manufactories, &c.....				116
Horse Stalls.....				742
Water Closets.....				7220
Urinals				575
Horses... ..				2594
Cows.....				493

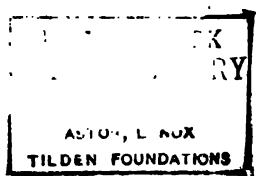
CASH RECEIPTS BY THE WATER DEPARTMENT,

During Civic Year ending 31st December 1879.

For dwellings, shops, offices and hotels.....	\$278771	22
“ Water Closets	23947	00
“ Urinals	709	00
“ Horses.....	4516	00
“ Cows	426	00
“ Horse stalls.....	869	00
“ Steam Engine.....	3808	00
“ Permits for Hoses.....	594	00
“ Permits for building purposes.....	871	76
“ Private Fountains.....	175	00
“ Manufactories, &c... ..	593	50
“ Water supplied through meters outside City Limits.....	10271	91
“ Water supplied through meters within City Limits.....	23730	05
		34001 96
“ Rents of meters outside City Limits.....	577	54
“ “ inside City Limits.....	1164	49
		1742 03
	351224	47
Miscellaneous.....	1804	79
Costs	119	36
	353148	62
Less refunded.....	670	17
	352478	45

CHAS. LAPIERRE, *Acc. M. W. W.*

	1847		1848		1849		Average three years
	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest
Lachine Canal, Lower Lock.....
Head of Aqueduct.....
Lachine Canal, Upper Lock.....	11.42	10.33	.....
St. Ann's do Lower Gate.....
Beauharnois do do Lock.....
Beauharnois do Upper do	10.33	9.83	10.00	9.00	10.75	10.33	10.36
Cornwall do Lower do	9.83	9.42	.....
Cornwall do Upper do	10.17	9.42	.....
Farran's Pt. do Lower Gate.....	9.67	8.83	.....
Rapide Plat do do Lock.....
Pt. Iroquois do do Gate.....
Galops do Guard Lock
Welland do Lower do	12.42	12.08	.....
Welland do Upper do	13.08	11.42	.....



ANNUAL REPORT
OF THE
SUPERINTENDENT
OF THE
Montreal Water Works

FOR THE
YEAR ENDING 31ST DECEMBER, 1880.

PRINTED by ORDER of the WATER COMMITTEE.



Montreal :
LOUIS PERRAULT & Co., CITY PRINTERS,
87 St. James Street.
1881.



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OF THE

SUPERINTENDENT

OF THE

Montreal Water Works

FOR THE

YEAR ENDING 31st DECEMBER, 1880.

PRINTED by ORDER of the WATER COMMITTEE

With the Compliments of

Louis Lesage,

Supt. of Water Works.

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ANNUAL REPORT
OF THE
SUPERINTENDENT OF THE MONTREAL WATER WORKS,
FOR THE
YEAR ENDING DECEMBER 31st, 1880.

To the

*Mayor, Aldermen and Citizens of the City of
Montreal.*

GENTLEMEN,

I have the honor to submit the following report on the works executed and the amount expended by the water department during the civic year ending on the 31st December 1880, with some remarks on the works proposed to be carried out during the present year. The accompanying schedules describe as follows :

Nos. 1 and 2. The duties of the water wheels and pumps.

Nos. 3 and 4. The duties of the steam pumping apparatus.

No. 5. The level of water, rain gauge and evaporation at the McTavish street reservoir.

No. 6. The repairs to main and service pipes, to hydrants and valves.

No. 7. The average daily consumption of water for each month from 1871 to 1880 in the City of Montreal.

No. 8. The different kinds and sizes of water meters belonging to the water department and to private parties.

No. 9. The pipes, hydrants, valves, service pipes, &c., laid down in the City during the year 1880.

No. 10. The pipes, hydrants, valves, service pipes and the number of houses supplied with water up to January 1881.

No. 11. The monthly average water pressure in the City mains during the year 1880.

No. 12. The positions of public fountains erected in the City up to 1881.

No. 13. The various details of expenditure in the water department during the year 1880.

No. 14. The inventory of the stock on hand January 1881.

No. 15. The number of assessed dwellings, stores, shops, offices, &c., in the City of Montreal for the year 1879 and 1880, with the assessed water rates thereon.

AQUEDUCT.

The cleaning of the aqueduct was begun on the 28th of July last. For this purpose the water had to be drawn out of the whole aqueduct and the City left dependent entirely on the reservoir, the capacity of which is not equal to more than a three days supply of water.

Owing to an accident to one of the floating gates and to the leaky condition in which the other gates and the scows were found to be, the water in the aqueduct could not be drawn off quickly enough, and the work had to be suspended when very little of the cleaning had been accomplished. The repairs to the gates and the scows took the best part of the summer and also a good part of the money appropriated to the cleaning of the aqueduct. In consequence the prosecution of the work had to be postponed to this year.

The new boom, which had been completed during last winter was put in place across the mouth of the still water basin at the entrance to the Inland cut on 28th April last, and has so far done the work expected from it; viz: prevented chips, drift-wood and other floating objects from entering the basin. All the repairs contemplated in my last annual report on the aqueduct, to bridges, fences and banks have been done. There still remains something to be done to ditches, banks, bridges and fences.

PUMPING WORKS.

The necessary repairs to the pumping machinery and buildings have been done. The most important of them were as follows; 1st. Replacing of the old bilge pumps in the breast wheel pump room, by a rotary centrifugal pump, which proves much more effective and less noisy, when at work, than the former one.

2nd. The re-cogging of the bevil wheel and the renewing of the split pump cylinder of turbine No. 1.

The steam pumping apparatus with their boilers have required but slight repairs during the year.

The pistons of the Worthington engine require considerable overhauling. Apart from this, the whole of the steam pumping apparatus are in good order.

The addition (recommended to the water committee in my last year's report) of a new turbine and pumps next to the turbine No. 1 has been ordered and the contract was awarded to John McDougal on the 24th of September last for the sum of \$11,487. The work will be completed by the 15th of next month. It is expected that this addition will be a valuable one to the water department.

A good deal of repairing was done to the dwellings of the men, such as the renewing of the floors, the painting of the roofs and the connection to the system of sewerage. The roofs of the boiler house and of the coal shed have been renewed. The ground and railings around the buildings have received the required attention. The whole is now in good order, except that the railings require painting.

For further details see the report of the engineer Mr. Walsh.

Schedules Nos. 1 and 2 in the appendix show the quantity of water pumped during the year by the water wheels, as follows :

Turbine No. 1 worked 7975 hours and pumped 1,387,755,456 gallons.

Turbine No. 2 and breast wheel worked 15507½ hours and pumped 1,707,229,876 gallons, making a total of 3,094,985,332 gallons.

The expenses of repairs and administration under the head "Wheel House" as per detailed statement No. 13 amount to \$6054.51 for raising 3,094,985.332 gallons 165 feet high, or \$0.012 per million gallons raised one foot high.

The quantity of water pumped by steam as per schedule No. 3 is as follows :

Engine No. 3 worked 1557½ hours and pumped 452,250,592 gallons at an expenditure of \$9,183.67 or \$0.123 per million of gallons raised one foot high.

Cost of raising one million gallons one foot high

	By water power.	By steam power.
In 1875	\$0.0200	\$0.119
" 1876	0.0140	0.144
" 1877	0.0158	0.080
" 1878	0.0106	0.170
" 1879	0.0093	0.119
" 1880	0.0120	0.123
Average of 6 years.	0.0136	0.126

The finishing shop is in good order, and has been utilized in making all the needful repairs to the pumping machinery, besides which it has turned out the following new work.

- 24 fire hydrants.
- 39 cast iron valves.
- 24 brass valve spindles and nuts.
- 26 cast steel dies.
- 70 ragged bolts.
- 684 iron keys for service boxes.
- 379 brass stop cocks.
- 114 brass three way branches.
- 259 brass nozles.
- 1756 brass covers for service boxes.

Besides a large quantity of bolts, nuts, shakles, &c. and repairs to valves, hydrants, water meters, &c.

TAIL RACE.

The difficulty experienced in former years in furnishing the requisite quantity of water from the Tail Race to the little river St. Pierre has been removed, by lowering the bed of the latter, and contract to that effect was made and carried out by Mr. Hennessey during the first part of the summer, at an expenditure of \$300.50.

The fences and ditches on the line of the Tail Race received their proper care and attention, and a new keeper has been appointed to fill the vacancy created by the death of the previous one.

PUMPING MAINS.

The pumping mains with their stop valves and brick chambers from the wheel house to the reservoirs, are in good order. During the summer an accident occurred to one of the 24 inch mains under the Grand Trunk Railway crossing near the wheel house, at its junction with one of the mains leading from engine No. 2. This gave the departement a good deal of trouble in repairing it, as the break was located close to the abutments of the Grand Trunk Railway bridge over the pipe track thereby endangering the foundation of these abutments. At that point are situated all the connections of the mains leading from the engines Nos. 1 and 2, with those from the water wheels, and on that account these pipes are very close one another, and more liable to such accident.

In order to avoid similar trouble in future and to save time and expense in case of a similar accident at that place, I advised

construction of a vault over that portion of the pumping mains. The work was immediately carried out, under contract, by Messrs. Bastien and Parker, at an expenditure of \$1,476.45.

Another leak occurred in December last on the connection of the 30 inch, pumping main with one of the 24 inch near St. Joseph street, caused by a faulty lead joint. As this connection is enclosed in a vault, the trouble was soon conquered without much difficulty or expense. The embankment over the pumping mains at their crossing at St. Antoine street, which had been originally constructed for the protection of two 24 inch mains only, is now scarcely sufficient to afford protection to the 30 inch main which was laid some years ago, on account of its being yearly diminished by the washing of the surface water which is allowed to cut through the made up earth for want of a proper drainage. I would recommend that this present embankment be enlarged a good deal more than it now stands and, this might be effected with only little cost by allowing all the scraping of the streets of that end of the city to be deposited into the new embankment, and in the course of a couple of summers the avenue might be made available for traffic in its full width, with proper drainage and insuring thereby a greater safety to the pumping mains.

The state of the brick tunnel, referred to in my last year's report, is still in the same, if not in worse condition, and requires a good deal of repairs.

RESERVOIRS.

The McTavish and Upper Level Reservoirs are both in good condition and very little has been spent on them for repairs.

HIGH LEVEL SERVICE.

The pumping engine for the high level service has been doing its requisite work with scarcely any other expense than that of wages and fuel and oil necessary to run the machinery. Schedule No. 4 shows that during the year, this pumping apparatus has worked 2647 hours and has raised to the upper level reservoir, a height of 220 feet, 37,985,256 gallons at a cost of \$2,293.50 or \$0.274 per million of gallons raised one foot high.

Cost of raising one million gallons one foot high,	
in 1876.....	\$0.24
" 1877.....	0.25 $\frac{1}{2}$
" 1878.....	0.35 $\frac{1}{2}$
" 1879.....	0.28 $\frac{3}{4}$
" 1880.....	0.27 $\frac{1}{4}$
Average of 5 years.....	0.281

DISTRIBUTION AND SERVICE PIPES.

The distribution and service pipes laid during the year have been as follows, viz: 108 lineal feet of 6 inch and 6036 lineal feet of 4 inch cast iron pipes, with one 4 inch stop valve and 4 fire hydrants. 200 feet of small pipe has been removed. There have been 318 new service pipes laid, as shown in schedule No. 9.

The total length of cast iron pipes laid in the city up to date is 22,728 lineal feet of 30 inch, 27,666 of 24 inch, 2,650 of 16 inch, 32,578 of 12 inch, 66,682 of 10 inch, 7968 of 8 inch, 196,230 of 6 inch, 335,555 of 4 inch, 2,382 of 3 inch and 6,935 of small mains, making a total of 701,384 lineal feet or 132.84 miles.

There are now laid 9 stop valves of 30 inch, 25 of 24 inch, 3 of 16 inch, 41 of 12 inch, 74 of 10 inch, 9 of 8 inch, 247 of 6 inch, 546 of 4 inch, 1 of 3 inch and 32 stop cocks of 2 $\frac{1}{2}$ inch, or a total of 987 valves.

There are 866 fire hydrants including 37 private ones. 25,752 houses are supplied with water. The whole as shown in schedule No. 10.

The large demand for water in the eastern part of the city, by the Q. M. O. & O. Railway, and the new abattoirs, will increase the draught on the city mains, to such an extent that the pressure of water in the portion of the city west of Beaver Hall between Dorchester and Sherbrooke streets, will be seriously diminished, and will necessitate the continuation of the 30 inch main on Sherbrooke street, from Papineau Road to the city limits east, and the laying of a 24 inch main through Colborne Avenue from Sherbrooke to St. Mary street, connecting on its way down, with all the mains of the cross streets, so as to relieve the distribution pipes of the western portion of the city above referred to, from being taxed beyond their capacity, in supplying this extra demand, as recommended in my annual report of 1877.

The committee of the Dominion Exhibition held in Montreal in september last, having been granted by the city, a supply of wa-

ter to be carried through pipes from the city limits to their grounds, a line of 4 inch pipe, 4385 feet long was laid in upper St. Urbain street, from which were branched 3287 feet of small iron pipes, distributing water through the grounds to 2 fire hydrants, 16 cattle troughs and 4 drinking fountains. These pipes were all temporarily laid, so as to save expense and time in cutting through the rock, which in this locality, is near the surface.

On account of the elevation of the intervening land between the McTavish reservoir and the Exhibition grounds, the latter could not be supplied by gravitation. A small pumping engine had consequently to be used, to force the water from the city limits to the different points of delivery. This apparatus was acquired from E. E. Gilbert & Co., and proved well adapted for the work.

Schedule No. 6 shows that there have been 83 leaks on the main distribution pipes, of which 19 were broken pipes and 64 leaking at the joints. There have been 10 stop valves of 6 inch, and 35 of 4 inch renewed; 17 fire hydrants have been removed and new ones substituted and 84 has been repaired. There have been 294 leaks on service pipes and 939 wooden boxes replaced by iron ones. The plumbers were called out 409 times for frozen service pipes, most of them caused by cold cellars. 203 hydrants were found frozen 653 times.

CONSUMPTION OF WATER.

The amount of water pumped during the year has been 3,547,235,924 gallons; making a daily average of 9,691,901 gallons, that is 514,397 gallons more than the daily average of the previous year, as shown in schedule No. 7.

The amount furnished to outside municipalities is 22,077,793 gallons. For flushing sewers and flooding rinks 467,000 gallons. For fires 1,180,000 gallons. For watering streets 27,944,550 gallons.

WATER METERS.

The number of water meters in use is 305 of which 236 belong to the city and 69 to private parties. Besides these, there are on hand at the water works shop 186, making a total of 491 water meters as shown by schedule No. 8.

In this connection I have to remark that a more stringent by-law is required for the protection of the meters so as to prevent fraudulent interference with them. In several cases the seals affixed

to the meters have been broken, and in one or two instances the meters themselves were removed without the knowledge of the department. Up to the present, parties wishing to use their own meters, have been allowed to do so, provided such meters are approved by the department, but experience has proved that often when one of these meters has been found out of order, the department has been obliged to put one of its own in the place of the damaged one, the owner neglecting either to repair it or to substitute a new one. The by-law ought to make it compulsory that in every case where water is used by meter, the meter should be the property of the water department.

Some of the meters at the work shop are considered quasi use less ; being worn out or injured by frost. Inventors have yet much to do in perfecting these instruments, in the matters of reliability and durability ; I have found it necessary to use great caution in purchasing, and not to take too many from one maker however highly recommended. The system of buying only a small number of meters of any one make at one time may seem objectionable in an economic point of view, as, undoubtedly any one maker could fill a large order at a cheaper rate than he could a small one, but on the other hand, if one make was adopted to the exclusion of all others the manufacturer so favoured being protected by patent rights could make his own price, and again, should the meter adopted, fail, on further trial to give satisfaction, or should a new instrument prove more efficient, the department might, as has been the case in other cities, be at serious loss thro' having a large stock of condemned meters on hand. I consider it advisable therefore to give those kinds most recommended a fair trial, and to keep an exact record of their services, from which I shall have a perfect knowledge of such as to reliability in registering, and durability, and which will guide me in future purchases.

INSPECTION OF WATER FIXTURES TO DETECT WASTE.

The service pipe inspections have been busy as usual, and have found in their visits the following water fixtures, in houses, out of order, viz. 609 stopcocks, 900 ballcocks, 497 ballcocks, 24 stopcocks, 611 flower valves, 650 flowercocks, 52 basincocks, 28 water valves, 390 kitchenpans. From this statement it will be readily understood that a large quantity of water is wasted through the bad plumbing work which is now practised in the city, and which is

daily becoming more general on account of the reckless competition amongst plumbers, and the sordid avarice of certain speculative builders who give their work to the lowest competitor, often a person ignorant of his trade. In order to remedy this state of affairs, a by-law is in course of preparation, according to section 204 of the city charter, for regulating the water fixtures in the houses, by prescribing the size, nature, strength, materials, mode of arrangement and repairs of the pipes, valves, cocks, cisterns, water closets and other apparatus to be used hereafter.

The want of a proper system for the ventilation of the soil pipes is also conducive to great waste of water, as many people allow it to run uselessly into the soil pipes thinking thereby to abate the noxious gasses which, for want of proper trapping and ventilation, emanate from these pipes.

The practice of allowing the water taps to remain open in winter (instead of using a little more fuel) so as to prevent the water freezing in the pipes, is another fruitful cause of waste, and is to be condemned, as too expensive to the department.

From the above it is evident that the system of house inspection must be strictly maintained in order to have the proposed by-law usefully carried out. I would also recommend the appointment of an additional inspector, as two, (the present number) are not able to visit once a year all the houses in the city.

WATER WORKS SHOP.

Nothing was done to the water works shop on Lagauchetiere street, and the business of this branch of the department had to be carried on with a good deal of inconvenience. Work had to be neglected for want of a proper place in which to do it. For instance the testing of pipes and meters had to be omitted in several instances. This state of things cannot long continue without resulting in serious loss to the city ; to say nothing of the confusion which must exist for want of proper and separate places in which to carry on the different trades worked at.

No repairs were done to the old buildings, as it was expected new ones would have been erected during the year, but through a misunderstanding in reference to the appropriations the project was deferred to this year. In the mean time plans and estimates have been prepared, and now await the sanction of the finance committee, to be carried into execution.

ADMINISTRATION.

The total expenditure on the administration of the department has been \$60,381.14 as shown in schedule No. 12, that is \$8,370 more than in the previous year. This is accounted for partly by accident to the pumping mains and heavier repairs to the pump machinery and its buildings, and partly by the construction of works and the expenses incurred for the Dominion Exhibit. These accidents which could not have been foreseen, have necessitated the water department asking from your City Council supplementary appropriations to the amount of \$5,700.00.

The whole respectfully submitted.

LOUIS LESAGE,
Supt. of W.

MONTREAL, February 16th 1881.

LOUIS LESAGE, ESQ.,

Superintendent Water Works,

Montreal.

SIR,

My report for the year 1880 is respectfully presented.

All recommendations contained in my last year's report were duly carried out, which with some other unforeseen items were as follows:

BREAST WHEEL.

Notwithstanding the age and large amount of work performed by this wheel and pumps, they are in remarkably good order. The repairs therewith during the past year were six pairs of new brasses and one gib in the connecting rods. Three new cross head pins. Three guide wheels rebushed with brass, and some new gibs and keys in the hubs of the wheel.

The old bilge pumps were replaced by a Heald & Cisco centrifugal, which is giving entire satisfaction.

TURBINE NO. 1.

The damaged cylinder of this machine was replaced by a new one between the 8th and 23rd of last november. Excepting four of the valve seats which will require renewal, it is in first class order. There being two spare seats on hand I would recommend that two more be ordered to meet possible emergencies.

TURBINE NO. 2.

The only repair required by this part of the machinery was renewing twelve bolts in one of the pump covers. At present it is in very good order.

BEAM ENGINES NOS. 1 & 2.

As those engines were only held in reserve during the past year they required no repairs, they are therefore in good order not requiring any thing more than packing the stuffing boxes if required.

WORTHINGTON ENGINE.

This engine continues to work well and required no repairs other than renewing 58 valve springs. The pistons were examined last summer, the low pressure ones are in capital condition, the high pressure and those of the slide valves will require refitting next summer. I hope the turbine being built by John McDougall will be ready in time to afford the opportunity for so doing.

STEAM BOILERS.

The steam and water pipes, valves mountings and settings are in good order, it will be necessary however to renew some of the cast iron parts.

I would here remark that a great saving is effected through the use of the International Boiler Fluid Compound as prepared by Mr. [Name] in the prevention of incrustation and removal of all undesirable matter from the boilers, for which it is a sovereign remedy, not being in any degree injurious to the iron.

The centrifugal steam pump which was in very bad order underwent repairs last fall, among which it was provided with three new [Name] 30 feet of 9 inch suction hose and 40 feet of 6 inch ditto.

SHOP.

Nothing in connection with the shop and foundry is in good order excepting the Smith's Bellows which I would recommend to be replaced by a few pulleys and belts.

MAINS.

The two 34 inch valves on the wheel house mains were provided with equilibrium valves, those of the engines mains being similarly provided some ago, in addition all the valves including those at Moffat's Mill were provided with air escapes as a precaution against rupture through recoil of the water when filling.

HEAD GATES.

The masonry to which the head gates of the large turbine are attached was much pushed over by the frost as to cause them to be very shaky, and as there is danger of breaking the frames I would recommend that it be put right during the coming summer.

BUILDINGS.

All the buildings are in good order, all necessary repairs being done during the past year, among which I would mention that the new boiler house was covered with Canada plate, and repainted.

The roof of the coal shed, weigh house and office were covered with new felt, pitch and gravel laid on in the usual way.

The most part of the floors of the dwellings were renewed, some plastering and other minor repairs effected. Connections between the dwellings and privies were severed, and an independent drain made for the houses. The old railing leading from the wheel house to the foundry was renewed, also a part of the side walk.

GROUNDS.

The bridge crossing the St. Pierre on the tail race is in a very dangerous condition and requires to be renewed.

In conclusion, I beg to inform you that as part of the sheeting is removed from the south wall of the wheel house, to make room for the new pumps, it will be necessary to cover it with cement.

The whole respectfully submitted.

I have the honor to be,

Sir,

Your most obedient servant,

THOMAS WALSH, M. E.

No. 1 SCHEDULE SHOWING THE DUTY OF TURBINE NO. 1.

MONTH	Time of Pumping Hrs. M.	Rounds Run	Gallons pumped.	Class of Oil.	Tallow	IN POUNDS				Coal for Hoisting
						Coal Oil.	Valve Line	Waste		
IN POUNDS										
January	741 15	176,287	111,489,121	67 76	31 50	128 00	30 00	26 03		94000
February	608 00	4-6,700	100,000,246	47 95		128 87		21 81		80000
March	740 00	101,740	110,000,017	64 00	14 00	133 07	21 00	21 76		101146
April	716 00	607,220	110,204,907	63 00		133 87		27 00		85,200
May	740 00	611,112	110,780,000	67 60		123 20		24 26		14700
June	710 00	606,916	141,176,106	114 76	8 00	00 87		25 60		
July	601 20	667,200	130,840,648	92 80	20 00	01 87	10 00	25 81		
August	607 20	620,100	133,803,144	85 60		100 20		25 00		
September	720 00	662,700	130,900,007	78 76	24 00	108 87	24 00	27 00		
October	652 00	608,376	117,508,000	68 80		131 70		24 00		5000
November	608 20	208 470	87,440,610	27 00	10 00	110 00	17 00	24 44		80000
December	622 00	424,500	90,000,000	60 00		100 87		22 00		
Total	7874 00	6,810,082	1,087,700,468	808 00	117,000	1,407 34	176 00	204 02		340,000
Last Year		6,000,720	1,127,537,007							

No. 2.—SCHEDULE showing the Duty of the Breast Wheel and of Turbine No. 2.

MONTHS.	Time of Pumping.		Revolutions.		Gallons pumped.	IN POUNDS.			
	Breast Wheel.	Turbine No. 2.	Breast Wheel.	Turbine No. 2.		Castor Oil.	Tallow.	Coal Oil.	Cotton Waste.
	Hrs. M.	Hrs. M.							
1880									
January	744.00	735.15	530,108	492,413	151,333,108	40.50	.....	157.25	.....
February . . .	663.00	273.40	485,883	162,533	95,985,568	29.25	.....	114.75	.....
March	741.45	618.20	546,492	424,729	143,740,708	45.00	.....	129.63	.....
April	708.25	677.25	539,918	505,356	154,700,552	63.00	.....	127.50	.....
May	731.40	741.20	556,167	552,975	164,005,016	74.37	30.00	145.00	.....
June	715.20	710.20	571,917	549,526	165,973,564	114.75	20.00	78.63	.....
July	672.50	674.25	522,493	514,537	153,480,440	83.25	.....	93.50	.....
August	581.10	581.55	470,832	404,529	129,553,428	63.00	25.00	104.12	22.19
September	675.00	716.30	541,524	494,991	153,404,220	69.75	.....	123.25	21.75
October	493.06	637.55	355,302	454,614	119,876,448	60.75	.....	142.50	20.25
November	616.15	706.45	475,421	565,218	154,014,572	49.50	.....	142.38	21.50
December ...	605.20	486.05	466,612	352,187	121,182,252	49.50	.....	157.50	23.50
Total ..	7,947.45	7,559.55	6,081,669	5,473,618	1,707,229,976	742.62	76.00	1,516.01	109.19
Last Year...	.....	.....	5,845,465	5,531,280	1,683,758,260	.....	.....	.....	.....

No. 1—SCHEDULE SHOWING THE DUTY OF TURBINE No. 1.

MONTHS.	Time of Pumping.	Revolutions.	Gallons pumped.	Castor Oil.	Tallow.	Coal Oil.	Valve-line.	Waste.	Coal for Heating.
	Hrs. M.								
IN POUNDS.									
1880									
January.....	741.15	478,537	111,499,121	67.50	31.50	153.00	30.00	28.03	94950
February.....	696.02	430,795	105,035,235	47.25	.....	128.87	.....	23.81	89630
March.....	740.08	101,649	116,860,917	54.00	12.00	133.87	24.00	23.75	101145
April.....	716.00	507,029	118,954,257	63.00	.....	133.87	.....	27.00	46530
May.....	740.00	511,112	119,089,096	67.50	.....	123.25	.....	24.25	14760
June.....	719.00	605,915	141,178,185	114.75	8.00	99.87	.....	25.60	.....
July.....	681.25	557,256	129,840,648	92.25	25.00	91.37	10.00	23.81	.....
August.....	687.25	568,168	132,838,144	85.50	.....	166.25	.....	28.00	.....
September.....	720.00	557,729	129,950,887	78.75	24.00	123.87	24.00	27.50	.....
October.....	652.30	503,376	117,986,008	58.50	.....	131.75	.....	24.93	5060
November.....	568.20	289,470	67,446,510	27.60	35.50	110.56	37.00	23.44	6990
December.....	522.55	424,598	98,030,868	49.50	.....	150.87	.....	22.00	8860
Total.....	7974.55	5,956,032	1,397,755,456	805.50	117.00	1,497.84	125.00	294.32	510625
Last Year.....	.....	5,696,729	1,327,337,857	.....	.....	.....	.....	.....	.....

No. 2—Schedule showing the Duty of the Breast Wheel and of Turbine No. 2.

MONTHS.	Time of Pumping.		Revolutions.		Gallons pumped.	Castor Oil.	Tallow.	Coal Oil.	Cotton Waste.	Coal for Heating.	
	Breast Wheel.	Turbine No. 2.	Breast Wheel.	Turbine No. 2.							Total.
1880	Hrs. M.	Hrs. M.									
January	744.00	735.15	530,108	492,413	1,022,521	40.50	.....	157.25	.....	1200
February	663.00	273.40	485,883	162,533	648,416	29.25	.....	114.75	.....	1300
March	741.45	618.20	546,492	424,729	971,221	45.00	.....	129.63	.....	.....
April	708.25	677.25	539,918	505,356	1,045,274	63.00	.....	127.50	.....	.....
May	731.40	741.20	555,167	552,975	1,108,142	74.37	30.00	145.00	.....	.....
June	715.20	710.20	571,917	549,526	1,121,443	114.75	20.00	78.63	.....	.....
July	672.50	674.25	522,493	514,537	1,037,030	83.25	.....	93.50	.....	.....
August	581.10	581.55	470,832	404,529	875,361	63.00	25.00	104.12	52.19	.....
September	675.00	716.30	541,524	494,991	1,036,515	69.75	.....	123.25	21.75	.....
October	493.00	637.55	355,302	454,674	809,976	60.75	.....	142.50	20.25	.....
November	616.15	706.45	475,421	565,218	1,040,639	49.50	.....	142.38	21.50	.....
December	605.20	486.05	466,612	352,187	818,799	49.50	.....	157.50	23.50	.....
Total ..	7,947.45	7,559.35	6,061,689	5,473,658	11,535,337	742.62	76.00	1,516.01	109.19	2500	
Last Year .....	.....	.....	5,845,465	5,531,280	11,376,745	.....	.....	.....	.....	.....

No 3.—SCHEDULES showing the Duty of Steam Engine No. 3.

MONTHS.	Pump- ing Time.	Revolu- tions.	Gallons pumped.	Coal used, Pounds			Average pressure on pump pistons.	Castor Oil.	Coal Oil.	Seal Oil.	Valve- line.	Waste.
				For pump- ing.	For Bank- ing Fire.	To raise 1,000,000 gallons.						
IN POUNDS.												
1880.												
January	23.30	13,979	6,094,844	84,750	6,240	6,725	75	4.50	38.00	17.50	22.50	15.00
February	204.20	180,493	56,335,339	233,000	21,750	5,005	74	11.25	35.87	19.49	185.00	.....
March	123.40	72,783	31,733,888	166,560	23,240	5,433	75	9.00	38.00	10.94	83.50	[17.00
April	.....	.....	.....	.....	.....	.....	.....	.....	33.38	19.63	.....	.....
May	.....	.....	.....	.....	.....	.....	.....	.....	30.25	6.56	.....	.....
June	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13.50
July	163.55	102,008	44,475,488	330,810	30,770	6,381	73	9.00	32.25	6.75	97.50	.....
August	264.00	185,251	82,080,516	443,248	16,130	5,683	73	20.25	56.12	19.63	143.50	18.50
September	131.00	87,737	38,333,333	313,170	25,890	6,248	76	6.75	4.25	4.38	90.50	16.00
October	256.40	176,438	76,931,786	408,780	45,100	5,938	75	13.50	87.25	19.69	184.00	.....
November	183.25	137,192	56,465,712	299,840	37,230	5,537	76	9.00	31.38	17.50	130.00	11.00
December	216.45	138,871	60,329,756	297,036	42,740	5,431	75	9.00	54.38	24.00	153.00	15.00
Total	1,557.15	1,037,272	453,260,592	2,300,139	281,060	5,443		95.25	354.63	163.37	1036.50	105.00

No. 4.—SCHEDULE showing the Duty of High Level Service Engine.

MONTHS.	Pumping Time.		Revolutions.	Gallons pumped.	Coal used, Pounds.			Average Pressure on Pump Pistons.	Castor Oil.	Valvoline.	Waste.
	H.	M.			For Pumping.	For Banking.	To raise 1,000,000 Gallons.				
1880										In pounds.	
January	197.10		211509	2538108	28019	6803	13720	100	9.00	60.00	
February	177.10		184836	2218032	26850	15808	19142	100	8.50	69.00	4.00
March	217.40		225425	2705100	31465	7070	14245	100	5.50	66.00	3.00
April	202.15		212116	2545392	27091	5602	12845	100	6.00	60.00	4.00
May	214.30		271365	3266380	35264	5659	12567	100	7.00	71.00	5.00
June	232.20		235808	3549696	34234	6127	11370	100	5.00	72.00	6.50
July	263.40		343403	4120836	42121	6849	11884	100	9.00	86.00	2.00
August	254.53		343934	4127208	40921	6742	11548	100	8.00	84.81	5.00
September	234.30		285849	3430188	35325	6497	12192	100	5.00	60.56	8.50
October	203.10		229864	2758368	30473	5844	13166	100	4.00	47.37	7.00
November	207.40		247969	2975628	33849	5644	13272	100	7.00	52.63	6.00
December	242.01		312350	3760320	39003	6901	12207	100	3.50	65.63	8.00
Total	2646.59		3165438	37985256	404618	85346	12899		77.50	795.00	59.00

No. 5.—**SCHEDULE** showing the Level of Water and Evaporation at the
McTavish Street Reservoir for the year 1880.

[MONTHS.]	Average Monthly Depth.	Rain Gauges, in inches.				Evaporation in inches.
		Rain.	Snow.	Snow reduced to Rain.	Total Rain.	
1880						
January	22.48	0 51	17.00	1.75	2.26	1.48
February	22.07	0.92	20.75	1.73	2.65	1.49
March	22.26	.....	20.50	1.83	1.83	2.33
April.....	22.63	1.93	8.50	0.84	2.77	1.92
May	22.03	2.21	.....	.....	2.21	3.85
June	21.92	2.78	.....	.....	2.78	4.24
July	21.25	5.83	.....	.....	5.83	5.39
August	20.57	1.05	.....	.....	1.05	5.70
September	22.09	2.31	.....	.....	2.31	3.76
October.....	21.57	3.88	1.00	0.25	4.13	1.79
November	21.88	3.55	11.50	1.29	4.84	1.83
December	22.57	0.10	12.50	1.28	1.38	1.97
Total.....	.....	25.07	91.75	8.97	34.04	35.75
Last Year .....	.....	17.36	73.05½	8.90	26.26	34.12

No. 6.—Number of places where the Corporation Plumbers were called during the winter of 1879-80, indicating the number of cases where the Corporation and where the Water Tenants were in fault.

CORPORATION SIDE.		LANDLORD'S AND TENANT'S SIDE.	
Frozen in street	1	Frozen in walls	292
" outside foundation...	5	" inside houses	36
Choked	75		
Total	81	Total	328
			81
		Grand Total	409

Repairs done by Work Shop Department during the year 1880.

REPAIRS TO MAINS.

Sizes of Mains	30 in.	24 in.	12 in.	10 in.	6 in.	4 in.	3 in.
Number of broken Mains	1	1	.....	1	6	9	1
Number of Joints blown out ..	1	1	3	19	14	26	.....

REPAIRS TO SERVICES.

Broken Stop-Cocks renewed	76
Leaks on couplings	62
Pipes broken over drains	22
Do in walls	47
Do from other causes	87
Rotten wooden boxes replaced by iron ones	920
Bows replaced by 3 way cocks	19
Total	1233

Hydrants, Hydrant Valves, Main Valves and Spindles renewed.

Sizes of Valves	6 in.	4 in.					
Number of Valves	2	24					
Do Spindles	8	11					
Do Hydrants			17				
Do Hydrant Valves			77				
Do Hydrant Rods			7				

Hydrants frozen 203—653 times.

No. 7 — COMPARATIVE TABLE showing the average Daily Consumption for each Month and for each Year, from 1871 to 1880, in the City of Montreal.

	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
January.....	5,678,174	5,974,840	7,290,852	7,095,986	8,384,520	8,852,518	8,753,185	8,483,438	8,711,520	8,675,067
February.....	6,168,120	5,449,747	7,063,017	7,898,776	8,722,379	9,389,035	9,492,078	8,748,908	8,825,552	8,892,987
March.....	6,485,962	4,900,149	7,012,675	7,744,778	8,648,153	10,538,483	8,540,736	8,823,335	9,082,027	9,430,162
April.....	6,356,588	8,064,601	7,279,311	8,410,697	8,677,975	9,544,695	8,450,236	8,679,603	9,198,983	9,098,494
May.....	6,559,613	7,282,758	6,833,600	7,523,392	8,843,682	8,686,748	8,818,552	8,253,495	9,279,565	9,132,068
June.....	6,569,112	7,392,330	7,865,951	7,449,288	9,342,653	9,734,198	9,706,864	9,773,318	9,487,630	10,238,362
July.....	6,814,104	7,643,349	7,786,051	9,039,422	9,361,989	10,527,499	10,074,892	10,337,277	10,025,080	10,574,083
August.....	7,142,800	6,543,069	8,563,739	9,452,456	8,391,686	10,988,611	10,039,691	9,910,444	10,312,233	11,097,648
September.....	6,780,880	7,224,962	7,055,885	8,995,643	9,065,770	10,026,061	9,615,654	9,112,664	9,763,752	10,720,280
October.....	6,547,957	6,615,049	9,168,172	8,561,262	8,614,050	10,141,385	8,234,079	9,663,996	9,034,211	10,131,764
November.....	6,046,708	6,268,247	6,862,111	7,974,388	8,821,966	9,995,269	7,844,593	9,116,044	8,270,213	9,230,560
December.....	6,104,278	6,622,527	7,017,387	8,395,810	8,547,777	9,770,511	8,183,582	8,191,048	8,163,285	9,046,544
Daily average for each year.	6,432,858	6,665,136	7,399,806	8,209,408	8,785,217	9,766,261	8,979,512	9,091,131	9,177,504	9,691,901
Increase over { preceding year.	712,552	232,278	734,670	809,602	575,809	981,544	.....	111,619	86,373	514,397
Decrease from { year.	.....	.....	.....	.....	.....	.....	786,749	.....	.....	.....

No. 8. — SCHEDULE showing the different kinds and sizes of Water Meters belonging to the City and to private parties.

[illegible]

Comm'rs' Salaries	26	36	1	2	119	2
Comm'n						
Recollet						
Total	36	36	1	14	317	13
<i>St. Ann's Ward.</i>						
Seigneurs						
Young	297	297			37	1
Brittania					1	25
Wellington					1	34
St. Etienne	90	90	1		2	36
Congregation					2	60
William					2	70
Chaboulez Square	180	180	1		4	57
St. Joseph					2	55
Sebastopol					2	64
Grey Nuns					2	101
St. Augustin					4	51
St. Maurice					2	52
Murray					1	28
College					1	55
Centre					2	133
Mullins	522	522			31	2
St. Francis					1	23
Magdalen					3	106
Shannon					1	33
Richmond					4	78
Duke					1	28
Inspector					1	25
Total	1089	1089	2	42	1182	35

SCHEDULE showing the Pipes, &c., laid down—Continued.

NAME OF STREETS.	Length in feet of Cast Iron Pipes.			Number of Valves.		Hydrants.	Houses supplied.	Length of Lead Pipes in feet.	Brass Stop Cocks.
	6 in. 4 in.		Total.	6 in. 4 in.	Total.				
	6 in.	4 in.							
<i>St. Antoine Ward.</i>									
St. Antoine.....							1	49	1
Mackay							1	45	1
St. Catherine							1	30	1
St. Mathew							4	172	4
St. Joseph							6	149	5
St. Bonaventure.....							61	1992	37
Peel.....	54	54		2	2		3	163	3
Drummond.....							3	135	3
Fort.....							2	61	2
Metcalfe.....							4	156	4
Durocher.....							4	92	4
Dorchester.....							6	107	5
Stanley							8	343	7
Redpath.....							3	77	3
Sherbrooke.....							1	49	1
Thistle Avenue.....							9	145	9
McTavish.....							1	51	1
St. Martin.....							2	26	1
Osborne.....							1	33	1
Delisle							1	44	1
Mountain							6	265	5
University							1	44	1
Scotland.....	20	20		2	2		1	26	1
St. Michel Lane.....							2	25	2

SCHEDULE showing the Pipes, &c., laid down—Continued.

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.			Number of Valves.		Hydrants	Houses supplied.	Length of Lead Pipes in feet.	Stop Cocks.
	6 in. 4 in. Total.			6 in. 4 in.	Total.				
	6 in.	4 in.	Total.						
<i>St. Louis Ward—Cont.</i>									
Brought forward.....									
Cadie-ux.....							24	576	17
German.....							1	39	1
Courville.....							1	50	1
St. Hypolite Lane.....							2	98	2
St. Constant.....							2	58	2
St. Denis.....							1	25	1
Sherbrooke.....							1	11	1
Grothee.....							1	47	1
Total.....							34	932	27
<i>St. James Ward.</i>									
St. Hubert.....									
St. Christophe.....							2	58	2
St. Andre.....							1	42	1
St. Andre Lane.....							1	55	1
Berri.....	126		126				3	99	3
Montana.....							3	127	3
Mignonne.....							1	43	1
Montcalm.....							2	36	2
Jacques Cartier.....							4	81	3
Total.....							2	36	3

Constant Lane	200	200	1	9	1
Visitation			2	26	1
St. Catherine			5	156	3
Total	326	326	27	767	23
<i>St. Mary's Ward.</i>					
St. Mary					
Visitation					
Craig			2	20	2
St. Catherine			6	122	3
Champlain			1	14	1
Parthenais			2	139	4
Madisonneuve			2	92	2
Colborne Avenue			2	39	2
Papineau Road			2	36	1
Voltigeurs			1	27	1
Total			1	66	1
				.....	1
			24	553	18
RECAPITULATION.					
East					
Centre					
West					
St. Ann's					
St. Antoine					
St. Lawrence					
St. Louis					
St. James					
St. Mary's					
Ward					
Centre					
West					
St. Ann's					
St. Antoine					
St. Lawrence					
St. Louis					
St. James					
St. Mary's					
Total					
Grand total	108 6036	6144	4	4	4
			318	9205	253

No. 10.—**RECAPITULATIONS** showing the Pipes, Hydrants and Valves laid down, &c., the number of Houses supplied with Water in the City of Montreal, up to 1st January 1881.

WARD.	LENGTH OF MAIN PIPES IN FEET.													NUMBER OF VALVES.										Hydrants.	Houses supplied.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
30	24	16	12	10	8	6	4	3	2 1/2	2	1 1/2	1	Total.	Public.	Private.	Total.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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MONTHS.	At Water Works Shop Lagau-chetiere St. Chas. Borrine	Central Fire Station Craig st.	Fire Station No. 2, St. Gabriel st.	Fire Station No. 3, Wellington st.	Fire Station No. 4, Chaboulez sq.	Fire Station No. 5, St. Catherine st.	Fire Station No. 6, Ontario street.	Fire Station No. 7, Dalhousie st.	Fire Station No. 8, Craig st.	Fire Station No. 9, Centre street.	Fire Station No. 10, St. Catherine st.	Fire Station No. 11, Ontario str. et.	Fire Station No. 12, Sci-gneurs street.
1880													
January.....	65.00	73.00	61.00	75.00	73.00	50.00	60.00	60.00	70.00	.....	29.00	59.00	.....
February.....	65.00	74.00	51.00	75.00	74.00	50.00	60.00	59.00	69.00	.....	30.00	59.00	.....
March.....	65.00	73.00	49.00	75.00	73.00	50.00	60.00	57.00	69.00	.....	30.00	58.00	.....
April.....	65.00	74.00	47.00	75.00	75.00	50.00	60.00	59.00	67.00	.....	25.00	60.00	65.00
May.....	65.00	74.00	49.00	75.00	74.00	65.00	60.00	58.00	68.00	.....	30.00	60.00	65.00
June.....	65.00	74.00	48.00	75.00	73.00	50.00	60.00	60.00	68.00	.....	30.00	60.00	65.00
July.....	65.00	74.00	47.00	75.00	72.00	50.00	60.00	58.00	70.00	.....	30.00	60.00	65.00
August.....	65.00	74.00	50.00	75.00	71.00	50.00	60.00	58.00	67.00	.....	30.00	57.00	65.00
September.....	65.00	74.00	47.00	75.00	71.00	50.00	60.00	58.00	69.00	.....	24.00	60.00	65.00
October.....	65.00	75.00	47.00	75.00	71.00	50.00	60.00	58.00	69.00	.....	22.00	57.00	65.00
November.....	65.00	73.00	47.00	75.00	72.00	50.00	60.00	59.00	68.00	.....	24.00	57.00	65.00
December.....	65.00	73.00	49.00	75.00	72.00	50.00	60.00	60.00	68.00	.....	25.00	57.00	65.00
Average 1880	65.00	74.00	49.00	75.00	73.00	51.00	60.00	59.00	68.00	.....	27.00	59.00	65.00
" 1879	64.00	71.00	50.00	75.00	73.00	49.00	59.00	57.00	69.00	70.00	27.00	58.00	

SCHEDULE No. 12.

TABLE showing the positions of Public Fountains erected in the City of Montreal, up to 1881.

LOCALITY.	Cast Iron Basins.	Stone and Cement Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.
1 Beaver Hall square.....				1			2
2 Bleury and Dorchester.....			1				1
3 Bonsecours Market.....					2		2
4 Chaboillez square.....						1	1
5 Charbonneau and St. Lawrence.....					1	1	1
6 Colborne near Flour Sheds.....					1	1	1
7 Court House square.....	2	1	2				5
8 Craig and Victoria square.....			1			3	1
9 Craig and St. Lambert Hill.....				1		1	1
10 Custom House square.....	2	1					1
11 Dalhousie square.....						1	1
12 Dorchester and Visitation.....					1		1
13 Grey Nuns and Common.....					1	1	1
14 Hay Market and College.....					1	1	1
15 Jacques-Cartier square.....	1			1		1	4
16 King Basin.....							1
17 Merchants' Wharf.....						1	1
18 McTavish st., at Reservoir.....				1			1
19 Military Basin.....						1	1
20 Mill at Waste Weir.....					1	1	1
21 Ontario and St. Denis.....					1	1	1
22 Ontario and Papineau road.....					1	1	1
23 Papineau square and Craig.....					1	1	1
24 Phillips square.....					1		1
25 do and St. Catherine.....						1	1
26 Place d'Armes.....	2	1		4			5
27 Queen's Basin.....						1	1
28 do.....			1				1
29 Richmond square.....		2					2
30 Seigneurs and Basin.....					1	1	1
31 Sherbrooke, near Drummond.....					1	1	1
32 Sherbrooke and Guy.....					1	1	1
33 St. Ann's Market.....					2		2
34 St. Antoine Market.....					1	1	1
35 St. Catherine and Papineau road.....					1	1	1
36 St. Gabriel Market.....					1	1	2
37 St. Mary near Suzanne.....				1		1	1
38 St. Thomas and Ottawa.....					1	1	1
39 Victoria square, south of Craig.....		1	2				9
40 do north of Craig.....	3						4
41 Viger square, Basin No. 1.....		1					1
42 do do No. 2.....		1					14
43 do.....			1		1		2
44 Viger Market.....					2	6	6
45 Wharf foot of Jacques-Cartier st.....						13	13
46 Wellington and St. Patrick.....					1	1	1
Total.....	10	8	8	9	25	48	104

At EXHIBITION GROUNDS, ST. CATHERINE ROAD.	Cast Iron Basins.	Stone and Ce- ment Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.
Opposite Crystal Palace.....	1	.....	.....	17
At Horse Ring.....	2
Distributed over grounds	12	12
For Ice Water.....	2	.....	8
St. Urbain st. and Mt. Royal Avenue.....	1	1
Bleury street do do	1	1
Total	1	2	14	41

MANAGEMENT.

No. 13.—Statement shewing the various details of the expenditure of the Montreal Water Works Department during the year 1880, ending 1st January 1881.

ADMINISTRATION.—

\$ CTS. \$ CTS. \$

AQUEDUCT.

Altering and repairing fences.....	302.52	
Renewing and repairing bridges ...	404.66	
' ing ditches	48.25	
floating gates to empty duct		
Aqueduct.....	1417.56	
slope wall.....	52.25	
shors and placing boom...	276.89	
keeper's house	179.61	
weeds	50.00	
.....	17.20	
caretaker	151.00	
salary.....	570.00	
	<hr/>	3469.94

WHEEL HOUSE.

engineer	1480.00	
urney, assistant	665.00	
idlish, do	665.00	
Larond, oiler	399.00	
Lecours, do	399.00	
Repairs to machinery	897.75	
do buildings.....	41.00	
do grounds and railings around buildings.....	178.70	
do dwellings	415.78	
Supplies of oil, tallow, &c.	724.18	
Sundries.....	189.04	
	<hr/>	6054.51

ENGINE HOUSE.

Repairs to machinery	314.68	
do buildings	1008.36	
Supplies, oil, tallow, &c.....	493.86	
Coal for steam.....	4010.53	
Wages running engine	3300.24	
Rent for land.....	50.00	
	<hr/>	9183.67
Carried over.....	<hr/>	18708

Brought over.....		18708.12
TAIL RACE.		
Repairs to fences and bank	290.37	
Lowering the bed of St. Pierre River.	300.50	
	<hr/>	590.87
PIPE TRACK.		
Repairs to valves and valve chambers	800.51	
Renewing valve spindles.....	76.44	
	<hr/>	876.95
RESERVOIRS.		
Guardian's salary.....	665.00	
McTavish: repairs to valve house, fences, bank, &c.....	128.11	
do fuel and light.....	110.71	
High Level; guardian's pay	200.00	
Sundries.....	18.80	
	<hr/>	1122.62
HYDRANTS.		
Inspecting, wages	2535.65	
Repairing, wages and materials	1153.55	
Thawing, horse and laborers.....	205.89	
	<hr/>	3895.09
PUBLIC FOUNTAINS.		
Repairing, wages.....	242.87	
Materials	189.48	
New drinking troughs..	340.00	
	<hr/>	772.35
DISTRIBUTION PIPES.		
Repairs to mains, services and valves, wages	6498.21	
Thawing pipes and carting water....	9.49	
Inspecting service pipes inside of houses	872.10	
Repairs to footpaths and service boxes, wages	1070.16	
Materials: iron castings, lead, tin, &c	99.15	
do wood, planks, nails, &c... ..	445.73	
do brick, cement, sand, &c.. ..	46.65	
Rope, drain pipes, &c.....	16.15	
	<hr/>	9048.64
	<hr/>	16306.52
Carried over.		35014.64

Brought over.....

35014 - 64

WORK SHOP AT LAGAUGHETIERE STREET.

Wages: foreman, clerk, turncocks, mechanics, laborers, carters and night watchman	5117.37	
Instalment on premises	800.00	
Iron, spikes, nails, tin, lead, &c.....	18.02	
Timber, wood, coal oil, lamps, &c...	90.11	
Tools, pails, drinking cups, &c.....	197.14	
Rent of foreman's house.....	135.00	
Sundries.....	25.83	
Fuel and light	332.99	
		<u>6716.46</u>

WORK SHOP AT WHEEL HOUSE.

Wages, 3 mechanics.....	215 78	
Materials, iron, copper, lead, &c.. ...	34 64	
Sundries.....	21 16	
		<u>271.58</u>

METER DEPARTMENT.

2 Meter inspectors	1312.15	
Testing and repairing	991.94	
Material	50.66	
		<u>2354.75</u>

ENGINE HOUSE AT MCTAVISH STREET.

(One stocker \$468, and one as- sistant engineer \$416.....	877.24	
Fuel for boiler	1315.03	
Oil, tallow, &c.....	69.60	
Repairs to building and machinery.	31.63	
		<u>2293.50</u>

MISCELLANEOUS.

(Contingencies for office, drawing paper, &c., ink, colours, instru- ments, &c.....	75.90	
Postage stamps, carters, sundries...	120.20	
House keep, superintendent	850.00	
Material for distribution pipes	618.00	
Lamp glass.....	17.00	
Household taxes and assessments	2021.31	
Household indicator	90.00	
Telephone.....	40.00	
		<u>3832.41</u>

15468.70

Carried over

50483.34

Brought over.....

50483.34

STAFF.

Superintendent..... 2520.00
 Assistant superintendent 1800.00
 Clerk..... 855.00
 Junior clerk 237.50

 5412.50

SUNDRIES.

4" pipes to each exhibition buildings 2434.06
 Stone vault at wheel house..... 1476.45
 Steam pump..... 574.79

 4485.30

Total.....

 9897.80

 60381.14

LOANS.

Wages..... 3957.19
 Tin, making lead pipes..... 382.69
 Copper..... 674.25
 Timber..... 37.10
 Bricks 2.00
 Drain pipes, cement..... 64.41
 Special castings..... 1492.72
 Iron, steel, iron pipes 456.30
 Tools 94.06
 Packing..... 31.62
 Sundries..... 267.16
 Meters 2042.70
 Patent hydrant..... 55.00

 9557.20

 388.18

 9945.38

New Turbine

Inventory of Stock on hand, January 1881.

Quantity	30 in.	24 in.	16 in.	12 in.	10 in.	8 in.	6 in.	4 in.	3 in.
1000	1311	528	2872	897	1080	30843	21593	200	
20	49	7	17	4	27	10	15	5	
7	5	4	42	15	15	11	7		
4	18	12	3	74	14	10	8		
2	4	3	9	13	8	40	6		
						7	5		

Quantity	30x30	30x24	24x24	24x16	16x12	12x10	12x8	12x6	10x4	10x3	10x2	8x6	8x4	6x6	6x4	4x3
1000	14	11	4	14	5	8	8	11	6	6	18	5	10	14	25	6
20	4	1	11	15	8	8	5	5	7	5	12	5	16	10	4	
Quantity	30x30	30x24	24x24	24x16	16x12	12x10	12x8	12x6	10x10	10x8	10x6	8x8	8x6	6x6	6x4	4x3
1000	5	3	3			3	3		5					6	1	
20	19			1	4		1	3		4	5			9		8

INVENTORY.—*Continued.*

Cast iron hydrants	18	Cast iron drinking troughs	2
Do do frames	11	Iron tubing, 1 inch ...	10400 feet.
Do do covers	51	Iron rods for service	
Do do seats	22	boxes	210
Do valve covers	21	Assorted steel	5960 lbs.
		Do iron	2100 "

SUNDRIES.

Valves stones.....	24
Service box stones	250
Drain pipes, assorted, lineal feet	75

BRASS WORKS.

2 inch cocks	13	$\frac{5}{8}$ inch 4 way branches.....	142
2 " pett valves	2	1 " union couplings.....	283
$1\frac{1}{2}$ " cocks	30	$\frac{3}{4}$ " do	27
1 " do	180	$\frac{1}{2}$ " do	53
$\frac{3}{4}$ " do	2	$\frac{1}{2}$ " do	265
$\frac{1}{2}$ " do	152	1 " caps for boxes.....	633
$\frac{1}{4}$ " do	102	$1\frac{1}{2}$ " do	73
$1\frac{1}{4}$ " nozies	13	Assorted valve spindles	30
1 " do	131	Hydrant nozies	56
$\frac{1}{2}$ " do	260	Hydrant with 2 in. brass nozies	1
$\frac{1}{4}$ " do	155	Brass couplings for street	
$1\frac{1}{8}$ " 3 way branches.....	113	watering	416
$\frac{1}{2}$ " do	157	Iron do do	90
$\frac{1}{4}$ " do	100	Hydrant valve seats.....	16

LEAD WORKS.

1 inch lead pipe	27267 lbs.
$1\frac{1}{2}$ do do	813 "
$\frac{3}{4}$ do do	12033 "
$\frac{1}{2}$ do do	6492 "
pig lead	28025 "

SCHEDULE No. 12.

TABLE showing the positions of Public Fountains erected in the City of Montreal, up to 1881.

LOCALITY.	Cast Iron Basins.	Stone and Cement Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.
1 Beaver Hall square.....				1			2
2 Henry and Dorchester.....			1				1
3 Ecours Market.....					2		2
Boilez square.....						1	1
Bonneau and St. Lawrence.....					1	1	1
Corne near Flour Sheds.....					1	1	1
House square.....	2	1	2				5
and Victoria square.....			1			3	1
and St. Lambert Hill.....				1		1	1
om House square.....	2	1					1
ousie square.....						1	1
chester and Visitation.....					1		1
Nuns and Common.....					1	1	1
arket and College.....					1	1	1
Cartier square.....	1			1		1	4
Basin.....						1	1
nts' Wharf.....						1	1
ish st., at Reservoir.....				1			1
y Basin.....						1	1
at Waste Weir.....					1		1
21 Ontario and St. Denis.....					1	1	1
22 Ontario and Papineau road.....					1	1	1
23 Papineau square and Craig.....					1	1	1
24 Philipps square.....					1		1
25 do and St. Catherine.....						1	1
26 Place d'Armes.....	2	1		4			5
27 Queen's Basin.....						1	1
28 do.....			1				1
29 Richmond square.....		2					2
30 Seigneurs and Basin.....					1	1	1
31 Sherbrooke, near Drummond.....					1	1	1
32 Sherbrooke and Guy.....					1	1	1
33 St. Ann's Market.....					2		2
34 St. Antoine Market.....					1	1	1
35 St. Catherine and Papineau road.....					1	1	1
36 St. Gabriel Market.....					1	1	2
37 St. Mary near Suzanne.....				1		1	1
38 St. Thomas and Ottawa.....					1	1	1
39 Victoria square, south of Craig.....		1	2				9
40 do north of Craig.....	3						4
41 Viger square, Basin No. 1.....		1					1
42 do do No. 2.....		1					14
43 do.....			1		1		2
44 Viger Market.....					2	6	6
45 Wharf foot of Jacques-Cartier st.....						13	13
46 Wellington and St. Patrick.....					1	1	1
Total.....	10	8	8	9	25	48	104

SCHEDULE shewing the number of Assessed Dwellings, &c.—*Cont.*

STORES, SHOPS, OFFICES, &c.

Number Assessed.	Tenanted.	Vacant and not Supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not Supplied.	Yearly Rate.
480	422	58	4 00	4548	4170	378	54 00
518	484	34	5 00	14	14	....	55 00
944	867	77	6 00	1	1	....	58 00
253	245	8	7 00	15	15	....	60 00
250	207	43	8 00	2	1	1	62 00
134	134	....	9 00	17	17	....	66 00
497	460	37	10 00	21	21	....	70 00
30	30	....	11 00	6	6	....	74 00
172	160	12	12 00	14	14	....	82 00
38	36	2	13 00	22	21	1	90 00
278	251	27	14 00	3	3	....	94 00
14	14	....	15 00	3	3	....	98 00
70	68	2	16 00	5	5	....	102 00
16	14	2	17 00	5	5	....	110 00
187	159	28	18 00	1	1	....	114 00
1	1	....	19 00	5	5	....	122 00
51	51	....	20 00	6	6	....	130 00
6	6	....	21 00	3	3	....	135 00
134	114	20	22 00	1	1	....	138 00
1	1	....	23 00	1	1	....	142 00
18	18	....	24 00	1	1	....	154 00
5	5	....	25 00	1	1	....	162 00
96	85	11	26 00	2	2	....	182 00
1	1	....	27 00	1	1	....	182 00
11	11	....	28 00	1	1	....	194 00
1	1	....	29 00	4	4	....	202 00
58	56	2	30 00	1	1	....	226 00
4	4	....	31 00	2	2	....	242 00
14	14	....	32 00	1	1	....	244 00
94	86	8	34 00	1	1	....	258 00
4	3	1	36 00	1	1	....	282 00
37	36	1	38 00	1	1	....	322 00
1	1	....	40 00	1	1	....	342 00
1	1	....	41 00	1	1	....	362 00
70	66	4	42 00	1	1	....	482 00
18	18	....	46 00	1	1	....	642 00
41	40	1	50 00	1	1	....	722 00
4548	4170	378		4715	4335	380	

SCHEDULE showing the number of Dwellings, &c.—(Continued.)
HOTELS AND TAVERNS.

Number assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
177	177	.....	\$12 00	365	365	.....	\$52 00
70	70	.....	17 00	4	4	.....	62 00
62	62	.....	22 00	1	1	.....	72 00
24	24	.....	27 00	1	1	.....	82 00
26	26	.....	32 00	2	2	.....	102 00
2	2	.....	37 00	2	2	.....	122 00
4	4	.....	42 00	1	1	.....	182 00
365	365	.....		378	378	.....

HORSES.		COWS.		STALLS.		URINALS.		WATER CLOSETS.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
2580	\$2.00	481	\$1.00	578 242	\$1.00 2 00	544 36 42 33	\$1.00 1 50 3.00 15.00	28 934 6772 5	\$2.00 3.00 4.00 15.00
2580		481		820		655		7739	

SPECIAL RATES.

BAKERIES.		BEER BOTTLERS.		FOUNTAINS.		FACTORIES.		STEAM ENGINES.		Total.	SUNDRIES.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Horse power		No.	Rate.
11	\$5 00	5	\$5.00	20	\$5.00	4	\$10.00	3	1	3	3	\$ 5.00
2	8.00	2	10.00	2	6.00	1	15.00	14	2	28	1	6 00
1	7.00	1	24.00	1	9.00	2	20.00	13	3	39	1	15.00
2	9.00	1	30.00	3	10.00	1	22.50	15	4	60	1	17.00
5	10.00			1	12.00	2	30.00	9	5	45	1	24.00
5	12.00					1	35.00	15	6	90	1	50.00
10	15.00					1	50.00	4	7	28	1	600.00
7	20.00							6	8	48	1	750.00
1	21.00							3	10	30		
1	25.00							2	12	24		
2	30.00							1	15	15		
1	40.00							1	18	18		
								3	20	60		
								1	25	25		
								1	40	40		
48		9		27		12		91		553	10	

ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

Montreal Water Works

FOR THE

YEAR ENDING 31ST DECEMBER, 1881

PRINTED BY ORDER OF THE WATER COMMITTEE



MONTREAL:

LOUIS MARGUERITE & CO., CIVIL ENGINEERS.

1882

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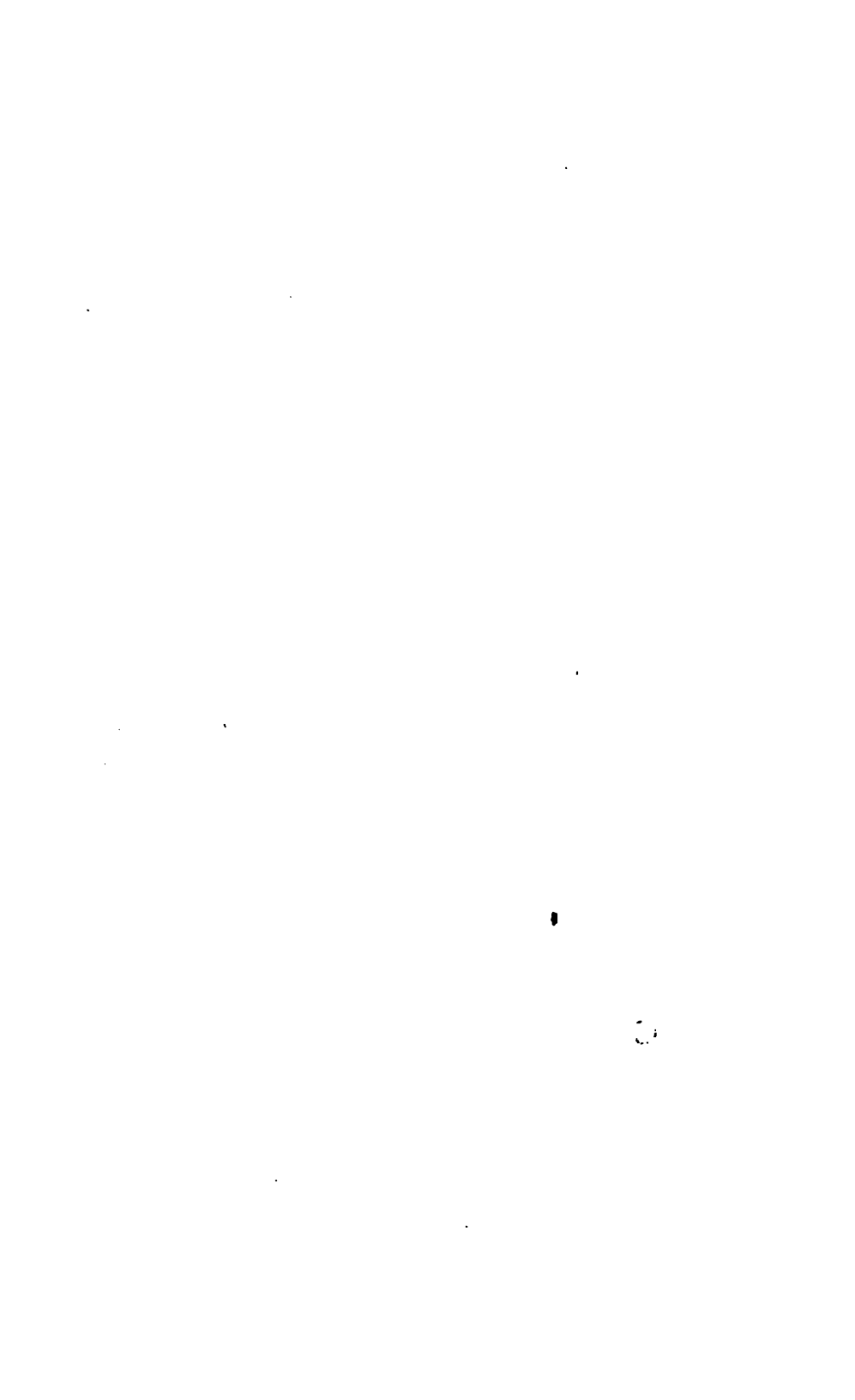


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ANNUAL REPORT

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OF THE

Montreal Water Works

With the Compliments of

Louis Lesage,

Supt. of Water Works.



MONTREAL :

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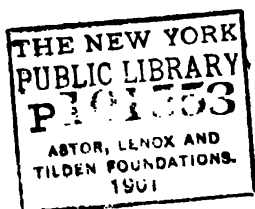


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ANNUAL REPORT
OF THE
SUPERINTENDENT OF THE MONTREAL WATER WORKS,
FOR THE
YEAR ENDING DECEMBER 31st, 1881.

To the

*Mayor, Aldermen and Citizens of the City of
Montreal.*

GENTLEMEN,

I beg to submit my annual report of the doings and of the principal transactions which have taken place during the year 1881.

AQUEDUCT.

Only such repairs have been done to the bridges, fences, banks and ditches which were the most needed ; other repairs which for the want of sufficient appropriations, have been omitted, and have become every year more urgent : such are the pointing of the joints in the masonry of the bridges and culverts, the cleaning of the culvert under the old aqueduct at its junction with the inland cut ; the repair and painting to the wood work of bridges, further repairs to the fences and to the banks, and cleaning of the side ditches along the whole line of the aqueduct.

The cleaning of that portion of the aqueduct between its junction with the inland cut and the regulating gates at the rock cut, by removing the loose stones detached from the slope walls, and rolled down in the bottom, the same as it was done for that portion from the regulating gates to the wheel house, would afford a good deal more water to the wheels, principally in winter when the sectional area of the water passage is greatly reduced on account of ice. The necessary plants is on hand, and the work should be prosecuted next summer.

One of the anchors used to keep the boom in place at the entrance to the still water basin, at the inland cut, was shifted out of place during last winter, apparently by the "Frazil," and carried down stream into the river. It was secured in time and set in place at the beginning of the season of navigation. As this may occur again a greater attention is paid to the action of the "Frazil" on these anchors, to see if something better could be devised to protect them, or to otherwise secure the boom. This trouble however is of no importance to the efficacy of the aqueduct, which, since the construction of the still water basin, has been remarkably free from the difficulties caused by "Frazil" in past winters.

WHEEL HOUSE AND PUMPING MACHINERY.

At the wheel house the additional turbine wheel and pumps, contracted by Mr. John McDougall, has been completed in October last, and has since been at work, giving full satisfaction. This piece of machinery is a credit to both the contractor and to the mechanical engineer of the pumping works, Mr. Thos. Walsh, who was the designer and the superintendent of its construction. The repairs to the buildings and machinery were as follows, viz: The bulkhead masonry of the flume of turbine wheel No. 1, which had been disturbed by the frost, was partially taken down, rebuilt and strengthened by additional masonry. The foundation wall of the building opposite the new turbine wheel, which had been in a leaky condition for several years, has been made water tight by cement grouting and clay puddle. The floor of that building was renewed by a red pine flooring. Two of the valve seats of turbine No. 1; one anchor bolt of one of the crank shaft girders of the breast wheel; a crank pin in the shaft of turbine No. 2 and 37 valve springs in the pumps of the Worthington engine were renewed. One battery of boilers was provided with new grate bars and bridges. The machinery is now in a good condition, except one of the pistons of the high pressure cylinders of the Worthington engine whose repairs were recommended in my last report; but had to be postponed for the want of the proper opportunity to do this work, which I hope will be done during next summer. The basement floor with a drain pipe to the cylinders in the Worthington engine house will require renewing. Some alterations to the turn tables in the coal shed; suitable and permanent traps for the exclusion of frost from the wheel pits are also required.

The engines Nos. 1 and 2 although kept in good order and ready for action, have not been used. It may however be found necessary to use them during the repairs to the Worthington engine next summer. As it has always been found difficult to use them simultaneously with the water wheels, and to make their pumps work harmoniously together, by the fact that they are all connected upon the same mains, which were the only ones available at the time of the erection of these engines. As an additional independent pumping main of 30 inch diameter has since been laid in connection with the Worthington engine, I recommend that the engines Nos. 1 and 2 be disconnected from the mains used by the water wheels and pumps and attached to this 30 inch main. This alteration would also permit to take away the complicated connections near the engine house, which are a source of weakness in one of the most important part of the water works. A couple of years ago a good deal of trouble and expenses were caused to the department, by the bursting of one of these connecting pipes, by which the water supply to the city was considerably endangered. With this object in view, I have prepared plans and estimates for these alterations.

The finishing shop attached to the pumping works is in good order. Besides the usual repairs done to the pumping machinery it has turned out the following new works, viz :

- 18 fire hydrants.
- 14 hydrant sockets.
- 13 cast iron valves.
- 21 brass spindles for valves.
- 567 brass stop cocks.
- 267 brass nozels.
- 2036 brass service box covers.
- 1720 keys for service boxes.
- 2 brass valves for pumps of turbine No. 1.
- 1 seat for " " "
- 78 ragged bolts.
- 4 street drills.
- 10 gibs for breast wheel arms:
- 24 bolts and nuts.
- 6 ratchet braces.
- 12 hydrant nuts.
- 8 " washers,

273 water meters repaired besides a great many repairs to hydrants, stop valves, and sundry works.

Schedules 1 and 2 in the appendix show the quantity of water pumped during the year 1881 by the wheels as follows :

Turbine No. 1 worked 7573½ hours and pumped 1,349,226,809 gallons.

Turbines Nos. 2, 3 and breast wheels worked 7770½ hours and pumped 1,556,281,114 gallons, making a total of 2,905,557,923 gallons. The expenses for repairs and administration under the head "Wheel House," as per detailed statement No. 13 in appendix, amount to \$6603.49, that is, \$0.013 per million of gallons raised one foot high.

Engine No. 3 worked 2309 hours and pumped 600,789,688 gallons at an expenditure of \$12,023.67 or \$0.121 per million of gallons raised one foot high.

Cost of raising one million of gallons one foot high :

	By water.	By steam.
In 1875	0.0200	\$0.119
1876	0.0140	0.144
1877	0.0158	0.080
1878	0.0106	0.170
1879	0.0093	0.119
1880	0.0120	0.123
1881	0.0136	0.121
Average of seven years	0.0126	0.125

TAIL RACE.

The Tail Race is in the same state it was last year. The keeper's house was repaired, and the bridge over the River St. Pierre was renewed. The bridge on the lower Lachine Road, wants a new flooring.

PIPE TRACK.

The pumping mains and stop valves are in good condition, and very little repairs were required. These mains and valves are as follows: Two mains of 24 inch diameter from the wheel house to the McTavish Reservoir 27666 lineal feet long in all, connected at the wheel house with the pumps of the wheels Nos. 1, 2, 3, 4, ten pumps in all, and with those of engines Nos. 1 and 2, four pumps in all, with six 24 inch, one 30 inch and one 40 inch stop valves at the wheel house, two 24 inch valves at Moffat's Hill on Atwater avenue, two reflux valves at St. Catherine street and Atwater avenue,

six 24 inch valves at St. Catherine street and McGill college avenue. and two 24 inch valves at the valve house of McTavish street Reservoir.

One pumping main of 30 inch diameter, from the Worthington engine's two pumps, to the Lachine Canal, where it is duplicated from the south of the canal to St. Joseph street and Atwater avenue ; from this last point running single through Atwater avenue to Sherbrooke street, thence in Sherbrooke street eastward to Papineau Road, connecting at its intersection with the two 24 inch mains at McGill college avenue. Total length of 30 inch pipe 22738 lineal feet.

On this main are one 30 inch valve at the engine house, four 30 inch valves at the Lachine canal, two on each side, two 24 inch valves at the temporary connection with the 24 inch main at St. Joseph street, one 30 inch check valve at Atwater avenue and St. Catherine street, two 30 and two 24 inch valves at the connection of Sherbrooke street and McGill College avenue, one 30 inch valve at Sherbrooke and St. Denis streets, and a last one at Sherbrooke street and Papineau road.

Nothing has been done to the embankment over the mains at their crossing of St. Antoine street and Atwater avenue ; and the same need of protection to them against frost still exists. If no filling can be procured from the street scrapings from the Road Department, other steps must be taken to accomplish this object.

The brick tunnel over the water course at Moffat's Hill, on the same avenue, has been left in its dilapidated condition, and cannot remain so much longer without some serious accidents. The brick work needs overhauling. Some repairs to the dry stone retaining wall, on the avenue, below Dorchester street having become urgent, these were made by the adjoining proprietor after having protested the City who claims to be free from any obligation to make these repairs. The courts will likely have to decide the question.

RESERVOIRS.

At the McTavish Reservoir, very little was done in the shape of repairs.

The floor of the valve house requires renewing, also the fence on Pine avenue.

The Peel street Reservoir has been cleaned, and portion of the tile drain, which was broken was repaired by new tiles. It will be

necessary however to substitute cast iron pipes to these, as they are still leaking. Otherwise all these reservoirs are in good condition.

HIGH LEVEL SERVICE.

The pumping engine for this service has been maintained in good state of efficiency, and is still so. The roof of the boiler house requires some repairs, and the chimney a coat of paint.

Schedule No. 4 shows the work done by the engine; that is, 45,151,116 gallons pumped into Peel street Reservoir in 2929½ hours, at a cost of \$2246.33, or \$0.226 per million of gallons raised one foot high.

Cost of raising one million of gallons one foot high :

In 1876.....	\$0.24
1877.....	0.25½
1878.....	0.35½
1879.....	0.28½
1880.....	0.27½
1881.....	0.226
Average for 6 years	0.272

DISTRIBUTION AND SERVICE PIPES.

The total length of cast iron pipes laid in the city during the year 1881 is, 4109 lineal feet, viz : 229 lineal feet of 6 inch, 3556 lineal feet of 4 inch, and 24 lineal feet of 3 inch, one 6 inch stop valve, six 4 inch do., and two 3 inch do. ; four fire hydrants and 438 service pipes.

The total length of cast iron pipes laid in the city of Montreal up to date is, 22738 lineal feet of 30 inch, 27666 lineal feet of 24 inch, 2650 lineal feet of 16 inch, 32578 lineal feet of 12 inch, 66682 lineal feet of 10 inch, 7968 lineal feet of 8 inch, 196,459 lineal feet of 6 inch, 339,411 lineal feet of 4 inch, and 9141 lineal feet of smaller mains, making a total of 705,493 lineal feet, or 133.62 miles.

There are 9 valves of 30 inch, 25 of 24 inch, 3 of 16 inch, 41 of 12 inch, 74 of 10 inch, 9 of 8 inch, 248 of 6 inch, 552 of 4 inch, 3 of 3 inch and 32 of 2½ inch ; making a total of 996 stop valves.

There are 870 fire hydrants including 37 private ones, also 26190 houses supplied with water.

The deficiency in the water pressure in the portion of the city west of University street, between Sherbrooke and Dorchester streets is increasing every year, and last summer numerous com-

plaints were received at the water works office from the citizens living in that locality. The remedy to this has already been indicated in previous reports, and the work which was begun a few years ago, had to be suspended, waiting for the opening of Sherbrooke street eastward of Papineau Road ; so as to allow the continuation of the 30 inch main to Colborne avenue ; when it is proposed to lay a 24 inch main down that avenue to St. Mary street, and connecting it at its intersection with the mains of Ontario, St. Catherine, Dorchester and St. Mary streets, which by the present arrangement, are drawing away too fast the water supply from the Beaver Hall district, and which are insufficient to supply the increasing demand for water in the eastern part of the city. Steps have already been taken for the opening of Sherbrooke street, and the purchase of the necessary pipes should be negotiated this spring.

An additional length of 1092 feet of 4 inch cast iron pipes has been laid, during last summer, in the Exhibition Grounds, to supply the new buildings which have been erected in the Mount Royal Park.

The water supply to these grounds for a few weeks previous, and during the time of the Provincial Exhibition, was procured by pumping from the main on Upper St. Urbain street with the small steam pump, as was done the year previous.

The work of laying separate service pipes to each tenant, which was stopped a few years ago, should be resumed and completed as soon as possible, so as to have a better control on the water supply to tenants, and thereby secure a considerable amount of water rates which is lost through that cause every year. I am informed by the accountant that in spite of the due diligence to collect the revenue a sum of \$ has been lost last year for the want of this proper control. It is the custom in many instances of this kind, for one tenant only amongst several others, receiving their water supply out of the same service pipes, to pay his water rates, so as to force the city to leave the water on, and thereby depriving it of the means, often the only one, of enforcing payment from the others. This is also taken advantage of by some proprietors of that class of houses to secure tenants at the expense of the public revenue. It is true that the law holds responsible for the water rates such proprietors who may fail to procure to their tenants a separate supply pipe from the street line, but the city on the other hand, is bound to furnish to each tenant, wherever possible, a separate service pipe to the street line, in order to enforce the law. This

work which is at present about half done, should be completed so as to make no distinction between the proprietors of one part of the city with those of another in enforcing the law.

Schedule No 6 shows that there have been 97 leaks on the main distributing pipes of which 25 were broken pipes, and 72 leaks at the joints. Many of these leaky joints which occur every year are the effect of poor work done by contract in years past, and have been ever since a source of expense to the department. There have been only two 6 inch stop valves and 13 fire hydrants renewed, and 16 of the first and 107 of the latter repaired. There have been 418 service pipes repaired, of which 348 were for leaks, and 70 for renewal of stop cocks. 1124 wooden stop cock boxes were replaced by iron ones.

The plumbers were called out 817 times for frozen service pipes of which 617 were on the tenants side.

FIRE HYDRANT INSPECTION.

As many inquiries are made to know how the fire hydrants in Montreal are maintained in order, and kept so principally in winter, I have thought necessary to give a fuller account than usual of the particulars.

330 fire hydrants were found frozen 1957 times, a good many of these hydrants whose brick chambers are the cause of their freezing are getting replaced every year by a new kind, being an adaptation of the jacketed hydrant called "non freezing," with improvements to suit the exigencies of our winter climate. Last summer 13 of the old hydrants were replaced by these new ones, and it is the intention to so replace gradually all the old hydrants. A few of them are on the list for next summer. In following this plan it is expected to reduce, to a great extent their liability to freezing. Out of these 1957 cases of frozen hydrants reported, a great many were only slightly so, and could have been used in that state in case of emergency; but, as the inspection is made thorough, it is thought best to keep the record of such cases.

For this inspection and supervision, the city is divided, in summer into 4, and in winter into 12 districts; each district having one inspector. The 4 summer inspectors are permanently appointed. The other 8, for winter, are taken from the general staff of the works, plumbers, pipe layers, &c., whose services in their own line are not required during the winter, but whom it is nevertheless very conve-

nient to keep about the works. The duty of the summer inspectors is to examine, clean and oil every hydrant in their respective districts 3 times a week. The winter inspectors must visit and examine daily every hydrant in their respective districts, in order to ascertain whether or not it is frozen. Any found frozen must be immediately reported to the water works shop.

For thawing hydrants, two upright small boilers each mounted on sleighs or wheels, according to the state of the roads, and furnished with about 50 feet of steam hose, are kept in winter in constant readiness to visit any point where their services may be required. The average time for thawing out a frozen hydrant, is about 5 minutes. These boilers are also provided with steam ejectors used for emptying the water from the hydrant casings, or the hydrant chambers where these cannot sludge into the sewers. They are also used on many occasions at fires to help the firemen in thawing their hoses when these get blocked up with ice.

PUBLIC FOUNTAINS.

The public fountains, and all the drinking places have been kept in order, and only one new drinking basin has been erected at Richmond square during the year. The care of the fountains in public squares is under the charge of the keepers of these squares, and the water is let on these only in day time. The care of the drinking basins and horse troughs is under the control of the summer hydrant inspectors, who have to maintain them in a state of cleanliness. As these are allowed to run all the time, a good deal of water is wasted every day. It is proposed to adopt some means to check this waste without curtailing the usefulness of the fountain.

SERVICE PIPES INSPECTION.

The inspection of service pipes in houses has been made as far as the two inspectors employed for this purpose could do it, but it is not sufficient. A third inspector is required so as to ensure the inspection of every house of the city during the year. The report shows the following water fixtures in houses, found out of order, viz: 668 bib cocks, 91 urinal cocks, 321 ball cocks, 58 stop cocks, 122 close cocks, 54 basin cocks, 54 closet valves, 68 water closets, 316 leaks in pipes.

WATER METERS.

The number of water meters in use is 335, of which 266 belong to the city, and 69 to private parties. Besides these there are on hand at the work shop 193, making a total of 528 water meters.

The inspection of these water meters has been carried on as usual, and have been visited, with a few exceptions, twice a month alternately, by the 2 meter inspectors, who keep a check on each other in the reading of indexes, with satisfactory results. As the indexes on all the meters are marked in cubic feet, it becomes necessary to convert these into imperial gallons in order to make the accounts in accordance with the tariff scale. This involves some time and trouble, which might be avoided by changing the tariff so as to apply to cubic feet instead of gallons, without effecting the scale. Such a change is already in contemplation in the revision of the by-laws concerning the water works.

CONSUMPTION OF WATER.

The total amount of water pumped during the year has been 3,506,347,611 gallons, as seen by schedule No. 7, making a daily average of 9,606,431, that is 85,470 less than the daily average of last year.

Of the above there has been 24,890,000 gallons furnished to outside municipalities, 587,000 for flushing sewers and flooding rinks. 1,082,000 for fires, 21,867,000 for watering the streets and about 19,900,000 gallons for public fountains. This last item is computed from the number of jets enumerated in schedule No. 12. Each jet is calculated at an average of one gallon per minute for 150 days with a deduction made for the jets stopped during the night.

The decrease in the daily consumption of water would appear to show a decline either in the population, or in the business of the city; but the increase of the revenue from the water rates which have been based upon the same scales for more than 10 years past, gives a contrary impression. This result is, in my opinion, due to the fact that the waste of water is kept in better check, on the one hand, by the department in paying greater attention to the maintenance in order of the distribution pipes through the city, and by the

controlling the water supply by meters to all manufacturing establishments ; on the other, by greater care on the part of the tenants in the use of the water in their premises.

With the view of improving the plumbing work in houses, in order to check still more the waste of water, and to promote the sanitary condition of the city, the master plumbers, at the request of the water department, were invited to meet and prepare a set of rules and regulations, and to form an association, the same as those which are now in existence in the principal cities of England and of the United States. Several meetings of these gentlemen took place at the City Hall during last winter, and the result of their labors has been a redaction of a proposed by-law which has been submitted to the water committee for their sanction and approval.

The latter after eliminating from that document the portion which belonged to the health department, began its revision, which I hope, will be completed during the present year.

WATER WORKS SHOP.

Considerable repairs were done to the work shop on Lagau-chetiere street, and by these means the building of a new work shop may be delayed for a few years longer. As the business of the department is increasing every year the time has come for a more expeditious mode of communication between the different stations of the department than the now obsolete needle telegraphic instrument, principally at the work shop, where a delay in transmitting important news, such for instance as the breaking of a water main which may be the cause of a good deal of damage if not promptly attended to. Now that the telephone is superceeding all other modes of communications at short distances, I would recommend that this mode be introduced into all the stations of the department, and put in communication with the police and fire stations. I think this change would prove economical and would save the city a good deal of expenses.

ADMINISTRATION.

The total expenditure on the administration has been \$64737.29 as shown in schedule No. 13, that is, \$4356.16 over that of the previous year. This excess is mainly due to the greater amount of repairs which have taken place and which will continue to do so as the city

progresses. The close attention to these repairs has resulted in the striction of the waste of water. And the expenditure incurred is but small sum compared to the interest which would be soon required, if this waste was allowed to grow to such an extent as to render necessary, before a reasonable time has arrived, the expenditure of large sums of money for the increase of the water supply.

The whole respectfully submitted,

LOUIS LESAGE,

Supt. of W. W.

Montreal, February 19th, 1882.



No. 1—SCHEDULE SHOWING THE DUTY OF TURBINE No. 1.

MONTHS.	Time of Pumping.	Revolutions.	Gallons pumped.	Castor Oil.	Tallow.	Coal Oil.	Valve-line.	Cotton Waste.	Coal for Heating.
IN POUNDS.									
1881	Hrs. M.								
January.....	687.30	560,653	130,632,149	58.50	.....	144.50	.....	21.50	97600
February.....	581.40	230,087	53,610,371	37.00	16.00	74.37	21.00	10.56	84410
March.....	289.30	287,205	55,268,765	36.00	.....	88.75	.....	13.00	89987
April.....	714.30	699,716	132,743,898	69.75	.....	136.87	.....	21.50	68260
May.....	744.00	578,742	134,846,886	65.25	.....	87.12	.....	34.50	9140
June.....	730.00	674,411	133,837,763	60.75	.....	77.87	.....	27.57	.....
July.....	744.00	593,297	132,338,901	90.00	20.00	44.63	25.00	50.56	.....
August.....	744.00	685,677	135,966,741	78.50	.....	57.87	.....	26.31	.....
September.....	720.00	635,418	134,759,384	73.50	.....	150.50	.....	23.43	.....
October.....	725.00	618,160	130,731,980	74.25	.....	139.62	95.00	24.50	15770
November.....	504.15	348,796	81,269,468	63.60	23.00	122.75	81.00	26.18	58810
December.....	699.00	469,481	107,202,973	81.00	.....	131.50	.....	26.60	76850
Total.....	7573.23	5,790,673	1,349,226,800	789.12	59.00	1,282.10	103.00	313.13	495920
Last Year.....	7374.55	5,956,032	1,387,755,456	805.50	117.00	1,437.84	125.00	294.92	516925

No. 2—SCHEDULE showing the Duty of the Breast Wheel and of Turbines Nos. 2 and 3.

MONTHS.	Time of Pumping.				Revolutions.		Gallons pumped.	Castor Oil.	Tallow.	Coal Oil.	Cotton Waste.	Coal for Heating.	
	Breast Wheel.		Turbine No. 2.		Breast Wheel.	Turbine No. 3.							
	Hrs. M.	Hrs. M.	Hrs. M.	Hrs. M.									
1881													
January	624.15	68.15	.....	.....	473,363	44,732	79,678,060	29.25	.....	144.50	21.50	.....
February	292.05	66.00	.....	.....	199,483	41,760	35,703,964	13.50	.....	72.25	13.43	.....
March	635.30	151.25	.....	.....	463,886	98,389	83,216,700	40.50	.....	102.00	21.62	.....
April	714.45	555.30	.....	.....	519,985	370,293	131,761,144	65.25	30.00	127.50	52.32	.....
May	679.45	729.30	.....	.....	482,912	503,427	145,978,172	63.00	.....	89.25	33.75	.....
June	720.00	720.00	.....	.....	555,585	601,073	156,385,384	58.50	20.00	78.62	28.62	.....
July	737.00	732.00	.....	.....	581,333	514,592	162,196,900	65.25	.....	48.87	27.43	.....
August	735.40	744.00	.....	.....	586,810	506,239	161,771,252	69.75	.....	57.37	26.87	.....
September	720.00	717.30	.....	.....	544,478	460,703	148,766,788	67.50	30.00	135.50	26.43	.....
October	673.50	637.35	25.50	23.860	479,561	392,073	131,053,792	63.00	.....	122.50	28.75	.....
November	574.50	388.30	693.30	867,394	436,190	223,334	172,205,436	202.50	.....	133.37	24.62	.....
December	662.50	92.15	728.45	475,973	475,973	47,969	150,563,522	110.25	15.50	157.25	22.37	.....
Total..	7,779.30	5,692.30	1,448.05	5,759,559	3,704,584	1,740,325	1,556,281,114	848.25	95.50	1,268.98	297.71	.....
Last Year...	7,947.45	7,559.55	.....	.....	6,061,669	5,473,668	1,707,229,876	742.62	76.00	1,516.01	109.19	2500

No. 3.—SCHEDULE showing the Duty of Steam Engine No. 3.

MONTHS.	Pump- ing Time.	Revolu- tions.	Gallons pumped.	Coal used, Pounds.			Average pressure on pump pistons.	IN POUNDS.					
				For pump- ing.	For Bank- ing Fires.	To raise 1,000,000 gallons.		Castor Oil.	Coal Oil.	Seal Oil.	Valves line.	Cotton Waste.	
	H. M.												
1881.													
January	347.20	203,435	88,097,660	495,830	40,530	6,030	74	11.25	46.87	26.25	184.00	14.00	
February	655.30	381,260	166,229,360	931,040	6,300	5,037	73	13.00	101.25	61.25	370.00	11.50	
March	542.45	322,947	140,804,892	774,800	11,000	5,510	75	15.75	127.37	45.93	416.00	16.00	
April	39.05	25,066	10,928,776	50,480	7,420	5,297	75	4.50	22.37	10.93	24.00	6.00	
May	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
June	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
July	84.15	51,799	22,584,364	124,400	18,210	6,310	75	9.75	10.12	.....	72.00	7.00	
August	107.40	67,051	29,284,236	172,570	29,050	6,950	75	4.50	12.25	.....	88.00	.....
September	209.30	128,229	55,907,844	289,810	42,100	9,215	75	11.25	26.37	3.18	128.00	18.00	
October	250.05	153,831	67,076,316	350,900	45,080	6,947	75	15.75	56.50	13.12	136.00	14.00	
November	73.00	44,340	19,332,240	99,890	13,100	5,814	75	4.50	52.25	16.31	48.00	10.00	
December	.....	.....	.....	.....	.....	.....	.....	.....	44.25	15.31	.....	.....	.....
Total	2,309.10	1,377,958	606,789,688	3,298,810	213,390	56,220	.....	94.50	509.60	190.98	1,406.00	96.50	

No. 4.—*SCHEDULE showing the Duty of High Level Service Engine.*

MONTHS.	Pumping		Revolu- tions.	Gallons pumped.	Coal used, Pounds.			Average Pressure on Pump Pistons.	In pounds.			Cotton Waste.
	Time.	H.			M.	For Pumping.	For Banking.		To raise 1,000,000 Gallons.	Castor Oil.	Valvoline.	
1891												
January	220	45	297603	3547236	40788	6188	13242	100	5.00	69 00	5.00	5.00
February	200	55	261390	3136380	36040	6428	13539	100	5.50	65.00	5.00	5.00
March	232	20	278602	3355224	37015	6929	13097	100	4.00	72.00	8.00	8.00
April	200	55	250537	3006444	32019	5996	12644	100	6.00	60.00	2.00	2.00
May	199	00	256789	3081468	31211	5934	12021	100	5.00	56 50	3.00	3.00
June	270	19	380208	4552496	44703	6918	11214	100	4.00	83.00	3.50	3.50
July	263	30	337337	4048044	41105	7200	11932	100	6.00	78.50	7.00	7.00
August.....	256	30	337089	4045068	39797	6950	11556	100	6.68	78.50	4.00	4.00
September	338	00	447883	5374596	53560	5246	11313	100	6.50	108.50	7.00	7.00
October	233	30	291768	3501216	37662	6351	12570	100	3.00	70.00	1.00	1.00
November.....	264	15	354478	4253736	46850	7151	12157	100	4.00	90.32	4.00	4.00
December	219	25	269909	3238908	33753	6878	12544	100	4.00	83.86	3.00	3.00
Total....	2929	24	3762593	45151116	475503	78069	12260		59 68	915.18		52.50

No. 5.—SCHEDULE showing the Level of Water and Evaporation at the
McTavish Street Reservoir for the year 1881.

MONTHS.	Average Monthly Depth.	Rain Gauges, in inches.				Evaporation in inches.
		Rain.	Snow.	Snow reduced to Rain.	Total Rain.	
1881						
January	22.55	.....	12.13	1.57	1.57	1 - 83
February	22.54	1.41	5.00	0.22	1.63	1 - 63
March	22.58	.....	22.50 $\frac{1}{2}$	2.88	2.88	1 - 74
April	22.75	0.37	0.00 $\frac{1}{2}$	0.02	0.39	3 - 09
May	22.64	2.90	.....	.....	2.90	3 - 97
June	22.61	1.02	.....	.....	1.02	4 - 94
July	22.43	3.49	.....	.....	3.49	4 - 97
August	22.12	0.91	.....	.....	0.91	5 - 29
September	22.64	1.69	.....	.....	1.69	4 - 08
October	22.54	3.99	.....	.....	3.99	1 - 91
November	22.64	1.34	10.75 $\frac{3}{4}$	1.85	3.19	2 - 25
December	22.36	2.97	4.00	0.37	3.34	2 - 09
Total		20.09	54.39 $\frac{3}{4}$	6.91	27.00	37 - 79
Last Year		25.07	91.75	8.97	34.04	35 - 75

G.—Repairs to Mains, Hydrants and Valves during year 1881.

SIZE.	30"	24"	10"	6"	4"	12"	Hydrant valves renewed.	Old kind Hydrants replaced by patent ones.	Hydrants renewed.	Hydrant Rods broken.
Number of times main broken.....			1	1	23					
of stop valves renewed.....				2						
of valves spindles ".....				4	12					
of times joints blown out.....			14	17	41	11	92	10	3	15

REPAIRS TO SERVICES.

Services broken over drain.....	14
“ “ various causes.....	196
Couplings leaking.....	75
Boxes & renewed.....	1118
“ 1½ “.....	6
Bows replaced by 3 way cocks.....	23
Cocks renewed.....	70
Burst in wall.....	63

Number of places where water works plumbers were called during
winter 1880 and 1881.

Pipes choked.....	50
Frozen outside.....	58
Other causes.....	33
Frozen inside.....	186
“ in wall.....	490
Total.....	817 times.

Number of patent hydrants, in position in City, up to

Jan. 1st. 1882..... 84 hydrants.

Hydrants frozen winter 1880–81. 330 hydrants frozen 1,957 times.

No. 7 — COMPARATIVE TABLE showing the average Daily Consumption for each Month and for each Year, from 1872 to 1881,
in the City of Montreal.

	1872.	1873	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
January.	5,974,840	7,296,852	7,095,986	8,384,520	8,852,518	8,753,185	8,483,438	8,711,520	8,675,067	9,548,641
February.	5,449,747	7,063,017	7,869,775	8,722,379	9,399,035	9,492,078	8,748,908	8,825,552	8,892,987	9,126,557
March.	4,900,149	7,012,675	7,744,778	8,618,153	10,538,483	8,540,736	8,823,335	9,082,027	9,430,162	9,009,366
April.	8,064,601	7,279,311	8,410,697	8,677,975	9,544,695	8,450,236	8,679,603	9,198,983	9,098,494	9,147,791
May.	7,282,758	6,833,600	7,523,392	8,843,682	8,686,748	8,818,552	8,253,495	9,279,565	9,132,068	9,058,872
June.	7,392,330	7,865,951	7,449,288	9,342,653	9,734,198	9,706,864	9,773,318	9,487,630	10,238,362	9,674,104
July.	7,643,349	7,786,051	9,039,422	9,361,989	10,527,499	10,074,892	10,337,277	10,025,080	10,574,083	16,423,208
August.	6,543,069	8,563,739	9,452,456	8,391,686	10,938,611	10,039,691	9,910,444	10,312,233	11,697,648	10,548,459
September.	7,224,962	7,055,885	8,995,643	9,065,770	10,026,061	9,615,654	9,112,664	9,763,762	10,720,280	10,981,133
October.	6,615,049	9,168,172	8,561,262	8,614,050	10,141,385	8,234,079	9,663,996	9,034,211	10,131,764	11,245,445
November.	6,268,247	6,862,111	7,974,388	8,821,966	9,995,289	7,844,593	9,116,044	8,270,213	9,230,560	9,093,571
December.	6,622,527	7,017,387	8,395,810	8,547,777	8,770,611	8,183,582	8,191,048	8,169,285	9,046,544	8,350,180
Daily average for each year.	6,665,136	7,399,866	8,209,408	8,785,217	9,766,261	8,979,512	9,091,131	9,177,504	9,691,901	9,606,295
Increase over { pre- ceding	232,278	734,670	809,602	575,809	981,044	.....	111,619	86,373	514,397	.....
Decrease from { year.	.....	.....	.....	.....	.....	786,749	.....	.....	.....	85,966

No. 8.—SCHEDULE showing the different kinds and sizes of Water Meters belonging to the City and to private parties.

KINDS.	Size in Inches.	Property of the City.				Private property.				Grand Total.
		In the City.	Outside the City.	At the Work Shop.	Total.	In the City.	Outside the City.	At the Work Shop.	Total.	
Gem	10		1		1					1
"	6	2	2		4					4
"	4	6	3	4	13					13
"	3	8		1	9	6			6	15
"	2	13		8	21	8			8	29
"	1 1/2	10		2	12	6			6	18
"	1	6		7	13	4			4	17
"	3/4	12		8	20	6		1	7	27
"	3/4	13		62	75	2		4	6	81
Union	3			1	1					1
"	2	2			2	1			1	3
"	1	27		4	31	1			1	32
"	1/2	98		42	140	6		1	7	147
Rotary Union...	4			2	2					2
"	3	1			1	1			1	2
"	2	1	1		2				2	2
"	1 1/2	4		1	5					5
"	1	12	1		13					13
"	3/4	13	1	4	18					18
"	3/4	2		1	3					3
Crown	3	2			2					2
"	2	3			3					3
"	1	12	1	1	14					14
"	3/4	4	1	9	14					14
"	3/4	10		2	12					12
Worthington...	3						1		1	1
"	2	2			2	6			6	8
"	1 1/2					1			1	1
"	1			2	2	1			1	3
"	3/4			10	10	15		3	18	28
Continental	3/4	2		4	6					6
Walsh	3/4			1	1					1
Desper	3/4			1	1					1
"	3/4			1	1					1
Maxim	1							1	1	1
"	3/4			1	1					1
Providence	3/4			2	2					2
Fairechild	3/4			1	1					1
Aubin	3/4			1	1					1
Lewis	1			1	1					1
Total.....		255	11	184	450	68	1	10	79	528

No 9.—SCHEDULE showing the Pipes, Hydrants, Valves, &c., in the Streets of the City of Montreal, during the year 1881.

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.			Wrought Iron.				Number of Valves.			Hydrants.	Houses supplied.	Length of Lead Pipes in feet	Stop Cocks.*		
	6 in.	4 in.	3 in.	1 in.	1½ in.	2 in.	2½ in.	Total.	6 in.	4 in.					3 in.	Total.
<i>East Ward.</i>																
Commissioners.....													1	22	1	
Barracks.....													1	40	1	
St. Paul.....			70										2	142	6	
Le Royer.....													2	51	2	
Total.....		70											14	255	10	
<i>Centre Ward.</i>																
Commissioners.....													1	27	1	
Notre Dame.....													1	23	1	
St. James.....													2	39	2	
St Sulpice.....							21	21					1	1	1	
Le Royer.....						48	48	48					1	1	1	
Total.....						48	21	69					6	89	6	
<i>West Ward</i>																

SCHEDULE showing the Pipes, &c., laid down—*Continued.*

NAME OF STREET.	Length in feet of Cast- Iron Pipes.		Wrought Iron.		Number of Valves		Total		Total	
	6 in. 4 in.	3 in. Total.	1 in. 1 1/2 in. 2 in. 3 in. Total.	6 in. 4 in.	3 in. Total.					
<i>St. Antoine Ward—Cont.</i>										
Brought forward.....	1346	.....	.....	1	.....	.....	137	6120	120	.....
Ontario Avenue.....	425	.....	.....	.....	.....	.....	1	120	1	.....
Imperial.....	.....	.....	.....	.....	.....	.....	.....	21	.....	.....
St. Monique.....	.....	.....	.....	.....	.....	.....	.....	10	.....	.....
Bedpath Avenue.....	9	.....	.....	.....	.....	.....	.....	.....	.....	.....
Versailles.....	.....	.....	.....	.....	.....	.....	.....	11	.....	.....
Beaver.....	.....	.....	16	.....	.....	.....	.....	.....	.....	.....
McGill College.....	102	.....	102	.....	.....	.....	.....	.....	.....	.....
Total.....	1780	1780	102	118	1	2	1	103	6311	126
<i>St. Lawrence Ward.</i>										
Blenny.....	.....	.....	.....	.....	.....	.....	.....	2	105	2
St. Urbain.....	1092	.....	.....	3	.....	.....	.....	2	85	2
St. George.....	.....	.....	.....	.....	.....	.....	.....	2	37	2
Balmoral.....	.....	.....	.....	.....	.....	.....	.....	3	59	2
Alexander.....	.....	.....	.....	.....	.....	.....	.....	1	33	1
Mance.....	.....	.....	.....	.....	.....	.....	.....	3	90	2
St. Lawrence.....	.....	.....	.....	.....	.....	.....	.....	1	25	1
Dorchester.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Anderson.....	.....	.....	.....	.....	.....	.....	.....	1	26	1
.....	.....	.....	.....	.....	.....	.....	.....	2	44	1

SCHEDULE showing the Pipes, &c., laid down.—Continued.

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.				Wrought Iron.				Number of Valves.				Hydrants.	Houses supplied.	Length of Lead Pipes in feet.	Brass Stop Cocks.				
	6 in.		4 in.		3 in.		Total.		1 in.		4 in.						3 in.		Total.	
<i>St. James Ward.—Cont.</i>																				
Brought forward.....																				
Ontario.....															4	49	3			
St. Christophe.....			99		99										2	69	2			
St. Andre.....			32		32										9	187	5			
Berr.....															6	136	4			
St. Catherine.....															1	39	1			
St. Louis.....															4	110	2			
Bonaparte.....															3	41	2			
Craig.....															1	10	1			
Maple.....															1	25	1			
St. Hubert.....															4	78	2			
Total.....	131				131				43						36	764	24			
<i>St. Mary's Ward.</i>																				
Panet.....															1	53	1			
Gain.....															2	49	1			
Visitation.....															2	24	1			
Parthenais.....															7	134	4			
Champlain.....															1	26	1			
Colborne Avenue.....	12				12										4	142	1			
Mignonne Lane.....																				

[illegible]

RECAPITULATION.

[illegible]

No. 11.—*SCHEDULE showing the average pressure in the City Mains during 1881.*

MONTHS.	At Water Works Shop Lagachetiere st. cor. of St. Chas. Borrmec	Central Fire Station Craig st.	Fire Station No. 2, St. Gabriel st.	Fire Station No. 3, Wellington st.	Fire Station No. 4, Chaboulez sq.	Fire Station No. 5, St. Catherine st.	Fire Station No. 6, Ontario street.	Fire Station No. 7, Dalhousie st.	Fire Station No. 8, Craig st.	Fire Station No. 9, Centre street.	Fire Station No. 10, St. Catherine st.	Fire Station No. 11, Ontario street.	Fire Station No. 12, St. Eugene street.
1881													
January	65.00	73.00	48.00	75.00	72.00	50.00	69.00	60.00	66.00	65.00	25.00	56.00	65.00
February	65.00	73.00	48.00	75.00	72.00	50.00	60.00	58.00	66.00	65.00	25.00	56.00	65.00
March	65.00	73.00	48.00	75.00	72.00	56.00	63.00	57.00	65.00	67.00	25.00	57.00	65.00
April	65.00	73.00	51.00	75.00	73.00	50.00	60.00	58.00	67.00	69.00	25.00	55.00	65.00
May	65.00	73.00	51.00	75.00	74.00	50.00	60.00	52.00	66.00	69.00	28.00	55.00	65.00
June	65.00	71.00	51.00	75.00	73.00	50.00	60.00	53.00	62.00	66.00	25.00	55.00	65.00
July	65.00	72.00	51.00	75.00	72.00	50.00	60.00	53.00	62.00	66.00	25.00	55.00	65.00
August	65.00	70.00	50.00	75.00	73.00	40.00	60.00	52.00	63.00	67.00	25.00	54.00	65.00
September	65.00	73.00	49.00	75.00	72.00	40.00	60.00	52.00	64.00	67.00	25.00	56.00	65.00
October	65.00	73.00	50.00	75.00	72.00	40.00	60.00	.....	65.00	.....	25.00	55.00	65.00
November	65.00	74.00	50.00	75.00	73.00	40.00	60.00	.....	63.00	.....	25.00	55.00	65.00
December	65.00	74.00	50.00	75.00	74.00	40.00	60.00	.....	64.00	66.00	25.00	54.00	65.00
Average 1881.	65.00	73.00	49.00	75.00	72.00	46.00	60.00	53.00	64.00	66.00	25.00	55.00	65.00
" 1880	65.00	74.00	49.00	75.00	73.00	51.00	60.00	59.00	68.00	.....	27.00	59.00	65.00

SCHEDULE No. 12.

TABLE showing the positions of Public Fountains erected in the
City of Montreal, up to 1882.

No.	LOCALITY.	Cast Iron Basins.	Stone and Ce- ment Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jugs.
1	Beaver Hall square.....				1			2
2	Bleury and Dorchester.....			1				1
3	Bonsecours Market.....					2		2
4	Chaboillez square.....						1	1
5	Charbonneau and St. Lawrence.....				1		1	2
6	Colborne near Flour Sheds.....				1		1	1
7	Court House square.....	2	1	2				5
8	Craig and Victoria square.....				1		3	1
9	Craig and St. Lambert Hill.....				1		1	1
10	Custom House square.....	2	1	2				1
11	Dalhousie square.....						1	1
12	Dorchester and Visitation.....					1		1
13	Grey Nuns and Common.....					1	1	1
14	Hay Market and College street.....					1	1	1
15	Jacques-Cartier square.....	1			1			4
16	King's Basin.....						1	1
17	Merchants' Wharf.....						1	1
18	McTavish st., at Reservoir.....				1			1
19	Military Basin.....						1	1
20	Mill at Waste Weir.....					1	1	1
21	Ontario and St. Denis.....				1		1	1
22	Ontario and Papineau road.....				1		1	1
23	Papineau square and Craig.....					1	1	1
24	Philipps square.....				1			1
25	do and St. Catherine.....						1	1
26	Place d'Armes.....	2	1					5
27	Queen's Basin.....						1	1
28	do.....							
29	Richmond square.....		2		1			3
30	Seigneurs and Basin.....					1	1	1
31	Sherbrooke, near Drummond.....					1	1	1
32	Sherbrooke and Guy.....					1	1	1
33	St. Ann's Market.....					2		2
34	St. Antoine Market.....				1	1	1	1
35	St. Catherine and Papineau road.....				1		1	1
36	St. Gabriel Market.....					1	1	2
37	St. Mary near Suzanne.....				1		1	1
38	St. Thomas and Ottawa.....					1	1	1
39	Victoria square, south of Craig.....		1	2				9
40	do north of Craig.....	3						4
41	Viger square, Basin No. 1.....		1					1
42	do do No. 2.....		1					14
43	do.....			1	1			2
44	Viger Market.....					2	6	6
45	Foot of Jacques-Cartier street.....							
46	Wellington and St. Patrick.....					1	1	1
Total.....		10	8	8	11	26	35	92

Removed full of 1881.

Removed summer of 1881.

Removed fall of 1881.

Removed summer of 1881.

SCHEDULE No. 12.—*Continued.*

At EXHIBITION GROUNDS, ST. CATHERINE ROAD.	Cast Iron Basins.	Stone and Ce- ment Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.	
Opposite-Crystal Palace.....				1	.....		17	North side.
At Horse Ring.....						2	"
Distributed over grounds.....						12	12	"
For Ice Water.....					2	.....	8	"
St. Urbain st. and Mount Royal Avenue.....						1	1	"
Bleury street and Mount Royal Avenue.....						1	1	"
Opposite Agricultural Buildings.....					1	.....	1	South side.
Distributed over grounds for fire purposes....							4	No'th & South side.
Total.....				1	3	14	46	

MANAGEMENT.

No. 13.—Statement shewing the various details of the
of the Montreal Water Works Department during the
1881, ending January 1st 1882.

ADMINISTRATION.—	\$	CTS.	\$	CTS.
AQUEDUCT.				
Altering and repairing fences.....	121	30		
Renewing and repairing ditches.....	230	75		
Cleaning ditches.....	174	29		
Setting anchors at boom.....	60	27		
Repairs to keepers house and sundries	102	57		
Cutting weeds.....	211	95		
Temporary caretaker.....	150	00		
Guardian's salary.....	600	00		
			1651	13

WHEEL HOUSE.

Walsh engineer.....	1600	00		
Kearny assistant.....	700	00		
Candlish do	700	00		
Lafond oiler.....	440	00		
Lecours do	440	00		
Repairs to machinery.....	188	05		
“ buildings	495	97		
“ grounds and railings round buildings	281	01		
“ Headgates	297	65		
Supplies of oils, tallow, &c.....	777	45		
Sundries	683	36		
			6603	49

ENGINE HOUSE.

Repairs to Worthington engine.....	155	07		
“ buildings.....	138	26		
Supplies, oils, tallow, &c.....	614	19		
Coal for steam.....	8168	94		
Wages running engines.....	3644	18		
Rent for land.....	50	00		
			12770	64
Carried over.....				

Brought over.....		21025 26
TAIL RACE.		
Repairs to fences and bridges.....	317 95	
PIPE TRACK.		
Repairs to valves and valve chambers.....	75 10	
RESERVOIRS		
Guardian's salary.....	700 00	
McTavish: repairs to valve house, fences, banks, &c.....	129 68	
McTavish, fuel and light.....	99 12	
High level, guardian's pay.....	200 00	
Sundries	267 09	
		1395 89
HYDRANTS.		
Inspecting, wages.....	2849 93	
Repairing, wages and materials.. ..	1693 48	
Thawing, horses and laborer.....	407 41	
		4950 82
PUBLIC FOUNTAINS.		
Repairing, wages.....	349 99	
Repairing materials.....	225 94	
		575 93
DISTRIBUTION PIPES.		
Repairs to mains, services and valves, wages	6878 99	
Thawing pipes and carting water....	1410 52	
Inspecting service pipes, inside houses.	1150 90	
Rep. to footpaths and service boxes, wages	1902 21	
Materials: Iron castings, lead, tin, &c.	204 21	
“ wood, planks, nails, &c	436 50	
“ bricks, cement, sand, &c....	50 67	
“ rope, drain pipes, &c	29 67	
		12063 67
WORK SHOP ON LAGAUCHETIERE ST.		
Wages, foreman, clerk, &c., laborers.	5421 75	
Instalment on shop.....	800 00	
Iron, spikes, nails, tin, lead, &c.....	90 56	
		19379 36
Carried over	6312 31	40404 62

Brought over.....	6312 31	40404
Timber, wood, coal oil, lamps, &c.....	76 08	
Tools, nails, drinking cups, &c.....	468 41	
Rent of foreman's house.....	140 00	
Sundries.....	52 20	
Fuel and light.....	456 80	
Repairs to shop.....	486 47	
	<hr/>	7392 36

WORK SHOP AT WHEEL HOUSE.

Wages, 3 mechanics.....	114 57	
Materials, iron, copper, lead, &c.....	78 52	
Sundries.....	61 92	
	<hr/>	265 01

METER DEPARTMENT.

Two meter inspectors.....	1360 88	
Testing and repairing meters.....	1453 18	
Materials.....	90 65	
	<hr/>	2913 71

ENGINE HOUSE AT McTAVISH ST.

One stoker and one assistant engineer.....	1012 18	
Fuel for engine.....	1151 89	
Oil, tallow, &c.....	44 86	
Repairs to buildings and machinery.....	37 30	
	<hr/>	2246 23

MISCELLANEOUS.

Contingencies for office, drawing pa- per, &c.....	104 17	
Postage stamps, carters, sundries.....	155 25	
Horse keep, Superintendent.....	600 00	
Map for distribution pipes.....	830 75	
Damages.....	48 00	
School taxes and assessments.....	3187 19	
	<hr/>	4925 36

STAFF.

Superintendent.....	2800 00	
Assistant Superintendent.....	2000 00	
Clerk.....	900 00	
Junior clerk.....	300 00	
	<hr/>	6000 00
		<hr/>
		24332 00

Total..... \$64737-2

LOANS.

PIPE LAYING.

.....	7074 86	
nk, making lead pipe.....	380 68	
; brass works	601 21	
r.....	39 80	
pipes, cement, lime, sand.....	149 64	
l castings.....	2183 78	
teel, Iron pipes.....	1112 97	
.....	17 64	
g.....	61 53	
es.....	448 30	
.....	2470 57	
	<hr/>	14549 98

NEW TURBINE.

.....	163 79	
ies	425 54	
ugall's contract.....	11487 00	
	<hr/>	12076 33

DUCING WATER INTO EXHIBITION BUILDINGS.

.....	773 27	
.....	85 23	
ies.....	140 39	
er.....	71 63	
	<hr/>	1070 52
Total.....		827696 83

No. 14—Inventory of Stock on hand, January 1882.

DESCRIPTION.	30 in.	24 in.	16 in.	12 in.	10 in.	8 in.	6 in.	4 in.	3 in.
Cast Iron pipes, in feet...	1988	1311	528	2872	937	1009	31365	14415	.....
Do slip sockets ...	36	49	7	17	12	27	27	10	14
Do double bends							8	9	
Do plugs	7	5	4	42	15	15	17		3
Do bonnets.....			4	18	12	8	74	14	10
Do stop valves.....	2	4	3	9	13	8	35	9	7
Do elbows.....				9	5		11	8	

Description.	30x24	30x12	30x6	30x4	24x4	12x12	12x10	12x8	12x6	10x10	10x8	10x6	8x8	8x6	8x4	6x6	6x4	4x4	4x3	10x8
Cross Branches.	2	2	2	1	.....	14	11	4	14	5	8	11	6	8	18	5	10	14	23	.....
Tee do	.....	6	1	.....	11	15	8	.....	8	7	5	7	5	.....	12	5	16	10	1	.....

Description.	30x30	30x24	24x24	24x16	24x12	16x12	12x12	12x10	12x8	10x10	10x8	10x6	8x8	8x6	8x4	6x6	6x4	4x4	4x3	10x8
Fork Pipes.....	5	3	3	.....	.....	.....	3	3	.....	5	.....	.....	.....	.....	.....	6	.....	.....	.....	.....
Taper do	.....	10	.....	1	2	4	.....	4	3	4	5	6	.....	.....	.....	9	.....	.....	.....	.....

INVENTORY.—Continued.

iron hydrants assorted...	20	$\frac{5}{8}$ inch d'ble iron boxes.....	187
do valve covers.....	22	$1\frac{1}{2}$ inch do do	21
do hydrant covers....	21	2 inch do do	22
do hydrant frames....	21	4 inch do do	2
do hydrant seats.....	21	Assorted steel in lbs.....	5700
□ pipes assorted in feet...	60	do iron do	5400
h iron tubing in feet.....	1350	Ingot copper do	1078
iron troughs.....	3	Brass in lbs.....	327
for service boxes.....	845	Block tin.....	155
h single iron boxes.....	225	Zink.....	391

LEAD WORKS.

Pig lead in lbs.....	10669
1 inch lead pipe in lbs.....	26626
$1\frac{1}{2}$ inch do do	857
$\frac{3}{4}$ inch do do	693
$\frac{1}{2}$ inch do do	8312

SUNDRIES.

Valve stones, (5 round).....	24
Single service stones.....	152
Double do do	4

BRASS WORKS.

h cocks.....	3	$\frac{3}{8}$ inch union couplings for	
h peet valvès.....	2	lead pipes	554
h cocks	15	$\frac{1}{2}$ inch do for lead pipes...	252
h do	159	$\frac{3}{4}$ inch do for lead and	
h do	111	iron pipes.....	22
h do	278	1 inch brass caps.....	417
h nozles.....	22	$1\frac{1}{2}$ inch do	21
h do	105	Assorted valve spindles.....	101
h do	183	Assorted hydrant nozles	55
h do	1130	Fire hydrant 2 in. do	1
$\frac{5}{8}$ inch 3 way	117	Street watering couplings.....	410
$\frac{1}{2}$ inch do	152	Hydrant valves seats.....	8
h do	139	$1\frac{1}{2}$ inch coupling for lead and	
h 4 way.....	151	iron pipes	6
h coupling for lead pipes	181	Brass tube in feet.....	200

No. 15.—TABLE shewing the number of Assessed Dwellings, Shops, Offices, Warehouses, Manufactories, Hotels, &c., City of Montreal, for the year 1881—1882, with the Assessed Water Rates thereon.

DWELLINGS.

Number Assessed.	Tenanted.	Vacant and not Supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not Supplied.	
4786	4414	372	\$5.00	25971	24887	1084	46
4208	4084	154	5.75	95	89	6	
3594	3508	86	6.50	37	32	5	
2850	2773	77	7.25	137	132	5	
1760	1729	40	8.00	22	22	....
1702	1655	47	8.75	210	202	8	
551	542	9	9.50	2	2	....
1056	1589	67	10.25	1	1	....
68	69	2	11.00	1	1	....
984	948	36	11.75	51	48	3	
66	65	1	12.50	8	8	....
729	699	30	13.25	1	1	....
151	135	16	14.00	132	125	7	
504	485	19	14.75	38	35	3	
34	34	....	15.50	1	1	....
303	352	11	16.25	75	71	4	
3	3	....	17.00	16	15	1
521	479	42	17.75	62	61	1	
187	182	5	19.25	8	8	....
1	1	....	20.00	55	55	....
334	317	17	20.75	2	2	....
35	33	2	21.50	15	15	....
259	246	13	22.25	19	19	....
12	13	....	23.00	1	1	....
153	146	7	23.75	6	6	....
308	280	28	25.25	2	2	....
112	109	3	26.75	1	1	....
				2	2	....
25971	24887	1084		26971	25844	1127	1
							1

SCHEDULE shewing the number of Assessed Dwellings, &c.—Cont.

STORES, SHOPS, OFFICES, &c.

Number Assessed.	Tenanted.	Vacant and not Supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not Supplied.	Yearly Rate.
493	458	35	4 00	4908	4565	343	-
477	445	32	5 00	45	41	4	50 00
1036	973	63	6 00	12	12	....	54 00
307	289	18	7 00	26	25	1	58 00
321	298	23	8 00	3	3	....	60 00
135	128	7	9 00	20	20	....	62 00
598	529	69	10 00	1	1	....	64 00
37	37	....	11 00	17	17	....	66 00
202	189	13	12 00	2	2	....	70 00
49	48	1	13 00	24	24	....	74 00
284	269	15	14 00	19	16	3	82 00
10	10	....	15 00	1	1	....	89 00
70	66	4	16 00	2	2	....	90 00
25	22	3	17 00	1	1	....	94 00
186	165	21	18 00	6	5	1	98 00
50	48	2	20 00	7	7	....	102 00
8	8	....	21 00	1	1	....	110 00
154	139	15	22 00	12	12	....	114 00
1	1	....	23 00	5	5	....	122 00
19	19	....	24 00	1	1	....	124 00
2	2	....	25 00	3	3	....	130 00
112	97	15	26 00	1	1	....	138 00
3	3	....	27 00	1	1	....	142 00
12	12	....	28 00	4	4	....	162 00
57	57	....	30 00	2	2	....	194 00
5	5	....	31 00	2	2	....	202 00
16	15	1	32 00	1	1	....	226 00
111	108	3	34 00	4	4	....	242 00
3	3	....	36 00	2	2	....	258 00
34	33	1	38 00	1	1	....	282 00
1	1	....	40 00	4	4	....	322 00
2	2	....	41 00	1	1	....	342 00
72	70	2	42 00	1	1	....	362 00
2	2	....	44 00	1	1	....	482 00
13	13	....	46 00	1	1	....	642 00
1	1	47 00	1	1	722 00
4908	4565	343		5143	4791	352	

Sl. No.	Particulars	Rate	Qty.	Total	Remarks
1
2
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RECAPITULATION.

	Tenanted.	Vacant.	Total.
Dwellings	25844	1127	26971
Stores, shops, offices.....	4791	352	5143
Hotels and taverns.....	312	.....	312
Total.....	30947	1479	32426
Steam engines.....			98
Special charges on manufactories, &c.....			105
Horse stalls.....			718
Water closets.....			8707
Urinals.....			628
Horses.....			3117
Cows.....			541

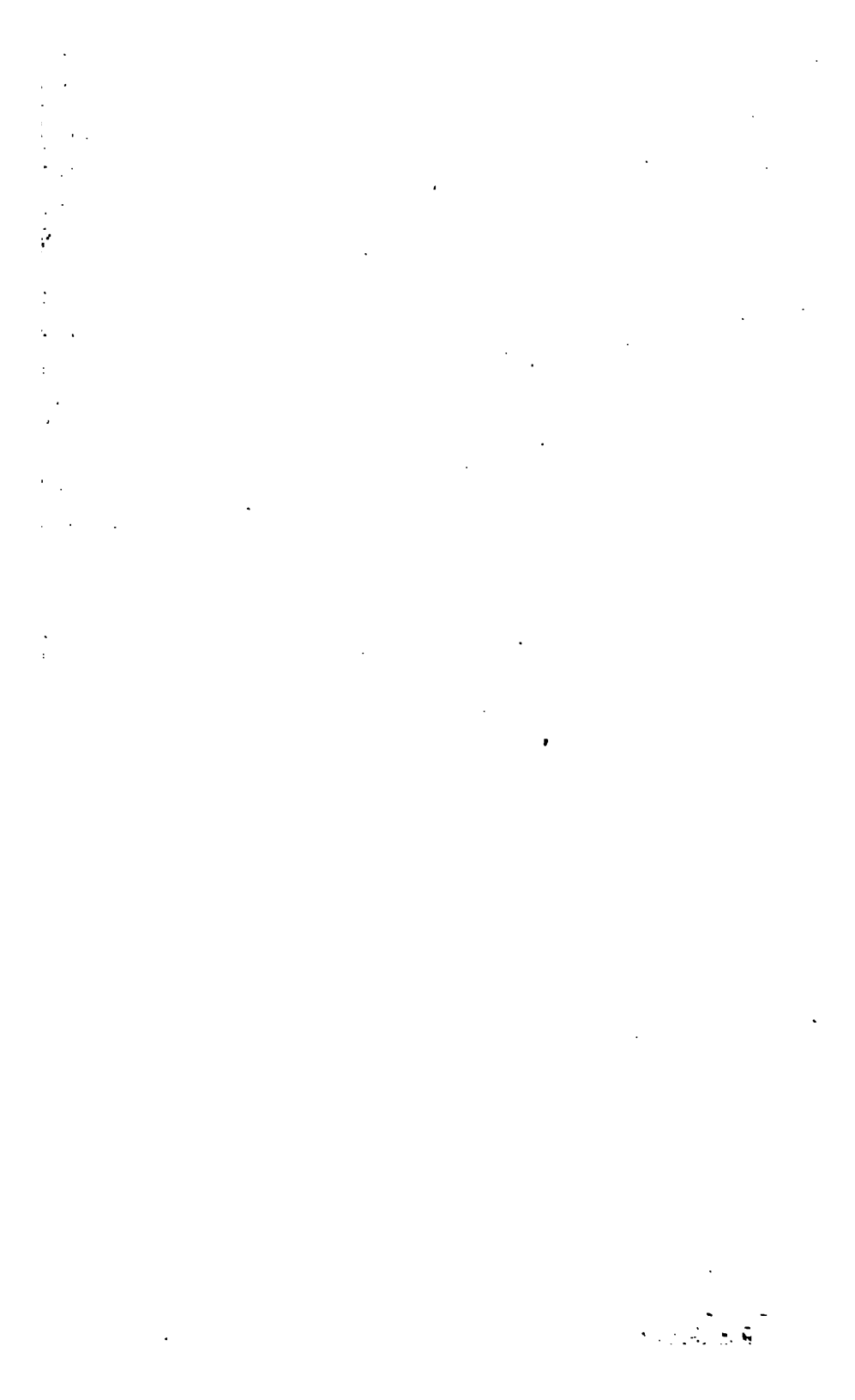
CASH RECEIPTS BY THE WATER DEPARTMENT

During Civic Year ending 31st December 1881.

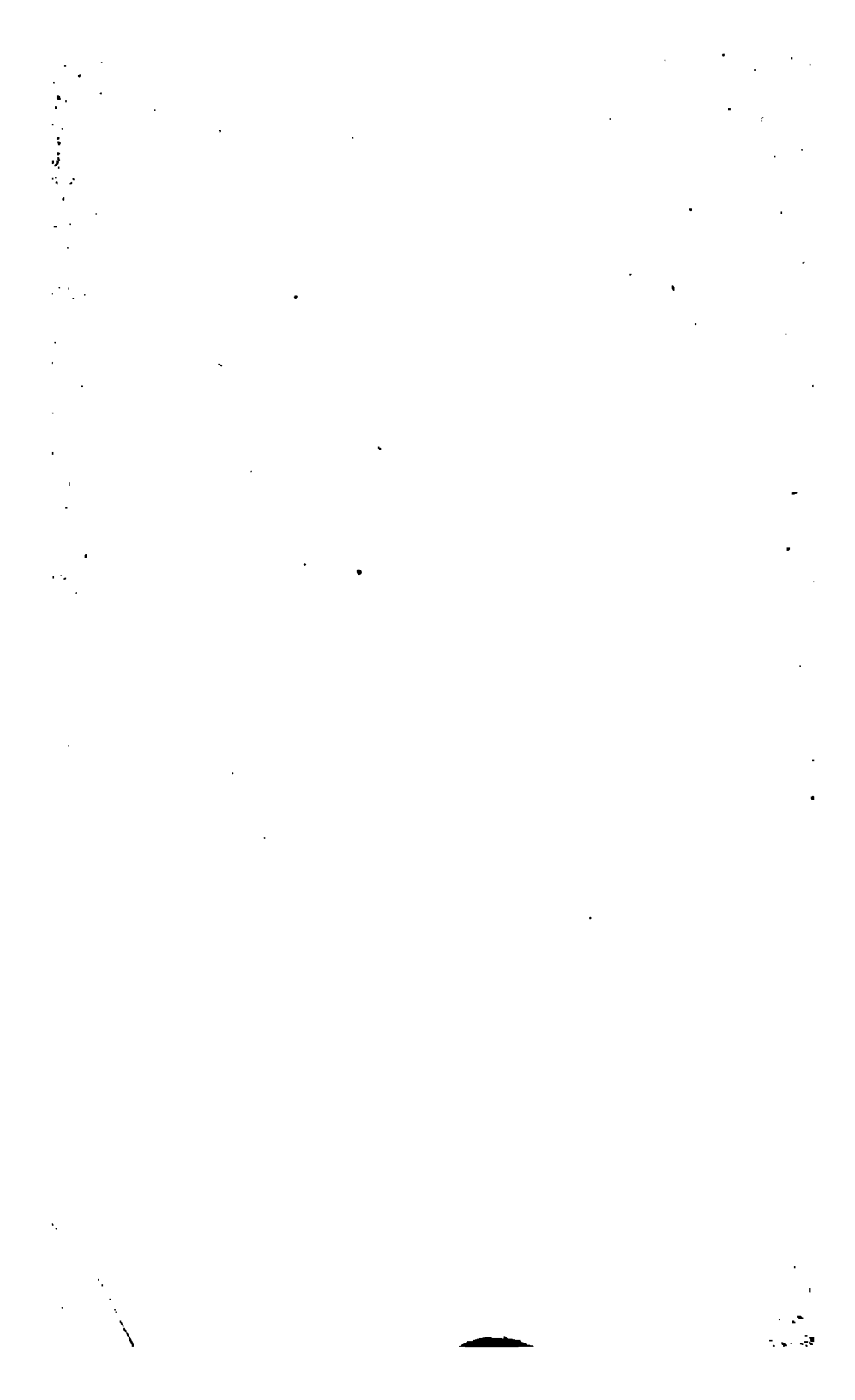
For dwellings, shops, offices and hotels.....	\$303437	13
“ Water closets.....	29594	00
“ Urinals.....	722	00
“ Horses.....	5730	00
“ Cows.....	479	00
“ Horse stalls.....	916	00
“ Steam engine.....	3836	00
“ Permits for hose to water streets, &c.	636	00
“ “ for building purposes.....	1115	56
“ Private fountains.....	148	00
“ Manufactories, &c.....	2413	50
“ Water supplied through meters outside city limits.....	11861	54
“ Water supplied through meters within city limits.....	37985	06
		49846 60
“ Rent of meters outside city limits.....	472	22
“ “ “ inside “	1578	09
		2050 31
	\$400924	10
Miscellaneous.....	3963	97
Costs ..	82	27
	\$404970	34
Less refunded.....	750	57
Net collections.....	\$404219	77
Amount returned into the Treasurer in 1880.....	366474	81
Increase.....	\$37744	96

CITY HALL,
Montreal, February 1882.

CHAS. LAPIERRE,
Acct. M. W. W.







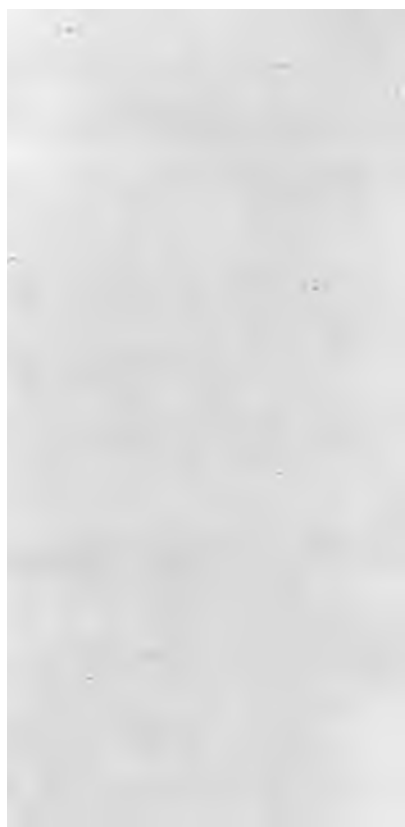
ANNUAL REPORT
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FOR THE
YEAR ENDING 31ST DECEMBER. 1882.

Printed by Order of the Water Committee.



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OF THE

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OF THE



in the

Louis Lesage,

Superintendent Montreal Water Works



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ANNUAL REPORT
OF THE
SUPERINTENDENT OF THE MONTREAL WATER WORKS,
FOR THE
YEAR ENDING DECEMBER 31st, 1882.

To the

*Mayor, Aldermen and Citizens of the City of
Montreal.*

GENTLEMEN,

I beg leave to submit to your Council my annual report of the transactions of the Water Department during the year ending December 31st 1882.

Most of the repairs contemplated in my last year's report, have been made. The water was withdrawn from the aqueduct during last summer on two different occasions, in order to permit of its being cleaned and of the removal of the loose stones which tended to obstruct the flow of water in that portion between the stop gates and the inland cut. This work had to be done under considerable difficulties on account of the limited time the water could be drawn off, without seriously interfering with the City supply.

The culvert under the old aqueduct, above its junction with the inland cut, has been found to be leaking so badly that it was not possible to repair it, and as this part of the aqueduct is not likely to be required again, I would advise that a dam of earth be made across it, over the culvert and that the drainage water be conducted across, in a channel made in the top of the proposed dam. This I consider the most practical and economical way of overcoming the difficulty.

The inland cut and the piers of the still water basin and the boom, are in good condition. Very little repairs were required to the banks. Some of the joints of the masonry of the bridge at the entrance will however require cementing.

Some of the farm bridges will require to be repaired. The bridges which are made of wood, require, as do the fences and ditches along the aqueduct a certain annual appropriation of money to maintain them in repair. Only a portion of the requisite repairs are done each year, that which appears to be most urgent having preference. The keeper's house, the roof of which is in a leaky condition, requires also some attention.

WHEEL HOUSE AND PUMPING WORKS.

A considerable amount of repairs has been done to the buildings, the machinery and the grounds. These works have been maintained all the year round in an efficient state of service, as will appear by the annexed report of the new chief engineer of the Pumping Works, Mr. D. Kearny, who enters fully into all the details. It will be seen also by this report, that further expenditure still will be required for the machinery and buildings.

The alterations to the pumping mains of Engines Nos. 1 and 2 were left over for want of adequate appropriations. This delay has not yet caused any serious inconvenience, as these engines were not called into service during the past year, but it is not known how soon an accident to the Worthington Engine or an extraordinary increase in the consumption of water, may necessitate their employment. It is therefore my duty to urge again this year the advisability of making the proposed alterations, which according to my estimate will cost \$2,644.00.

There was erected at the wheel house in 1873 an auxiliary high pressure steam engine to work the pumps of wheel number one, when that wheel should be stopped through the blocking of the aqueduct by frazil. This steam engine was only used for a few days when it was found not to answer the purpose intended and since the completion of the inland cut, the difficulty which suggested the erection of the engine, being in a great measure obviated I would recommend its removal and for the following reasons: 1st. Because of its interference with the foundation walls of the Turbine pumps which had to be deprived of

some of their important stay bolts, in order to make room for the engine ; 2nd. As the City, on account of having its pumping works in one of the adjoining municipalities, is highly taxed for every part of its machinery, whether in use or not, I think that under the circumstances, the City will be benefitted by removing said engine and selling it for whatever it may bring.

The work shop at the wheel house besides the ordinary repairs to the pumping machinery, and to the hydrants and stop-valves and water-meters, has turned out the following new work, viz :

- 27 fire hydrants.
- 50 hydrant watering nozles.
- 18 hydrant nuts.
- 7 hydrant rods.
- 3 hydrant bushes and nuts.
- 7 hydrant sockets.
- 35 four inch valves.
- 18 grate bars.
- 330 bolts and nuts, various sizes.
- 107 brass stop cocks of various sizes.
- 255 brass nozles and three way branches.
- 831 service keys.
- 1153 service box caps.
- 1 doz. of steel drills.
- 15 fountains fitted with ball cock boxes.
- 8 brass flanges for suction hose.
- 5 flanges for meters and many other miscellaneous articles.

The total amount of water pumped by water power during the year, amounts to 3,299,029,365 gallons, with an expenditure of \$6,412.90 as shown in schedule No. 13 under the head of wheel house, making \$0.0118 per million of gallons raised 1 foot high.

The total amount of water pumped by steam power at the wheel house during the same period amounts to 192,837,168 gallons, with an expenditure of \$8,214.21, making \$0.258 per million gallons raised 1 foot high.

It will be seen by the comparison made below that the cost of pumping by steam power, this year, is double that of the preceding years. This is principally due to the fact that there was not occasion to use the steam engine to such an extent as in 1881, on account of the higher level of water in the aqueduct, which per-

mitted the use of the water wheels to better advantage during last year and allowed the engine to remain idle much longer, although the staff had to be maintained the same. This circumstance as well as the fact of larger repairs than usual having been done to the engine house, has contributed to increase the cost of pumping by steam power.

This will be the case until it has become necessary to make more constant use of steam power.

Cost of raising one million gallons one foot high :

	By water.	By steam.
In 1875	\$0.0200	\$0.119
1876	0.0140	0.144
1877	0.0158	0.080
1878	0.0106	0.170
1879	0.0093	0.119
1880	0.0120	0.123
1881	0.0136	0.121
1882	0.0118	0.258
Average of eight years	0.0134	0.142

TAIL RACE.

The flooring of the bridge over the Tail Race on the lower Lachine Road was renewed and all the fences were repaired.

Some of the old excavations on the land near the main road, were filled so as to prevent the gathering of putrid water, which was endangering the health of the neighbourhood. The lot of ground at the mouth of the Tail Race is rented yearly to the G. T. Ry. Boating Club. Another lot alongside and east of the Tail Race, surrounded by the old bed of the River St. Pierre, containing about six arpents, is rented to Mr. M Hennessey of St. Gabriel Village. The land lying between Grand Trunk and Mullin streets, extending all through St. Gabriel Village, and for which the City is taxed by that village to a considerable amount, ought to be rented, even if it does not bring more than will cover the taxes. This land was originally acquired by the City at the time the Water Works were constructed, for the purpose of making the Tail Race through it, the River St. Lawrence at a point nearly opposite Tate's clock. But as this line had to go through some of the property belonging to the government, and the latter refused its consent

the scheme, it had to be abandoned, and the land so acquired has ever since remained idle, except that portion inside the City limits which has in greatest part been sold in town lots. An attempt was again made during last summer to sell at public auction the residue of the City lots, but the sale had to be stopped after the disposal of two lots, no other bidders being found to offer even as much as the upset price put on by the Corporation. Some of the remaining City lots will require fencing next summer.

PIPE TRACK.

All the pumping mains with their stop valves are in good condition, and had very few repairs done to them, nor will they require anything beyond the ordinary repairs, this year.

The repairs to the tunnel on Atwater Avenue were resumed during last summer, but had to be stopped before they were completed, for want of funds. The work was not stopped, however, before the worst portion of the tunnel was made secure, and the tunnel may remain as it now is for a few years.

Nothing has been done to the embankment over the pumping mains at their crossing of St. Antoine Street on Atwater Avenue. There have been very little street scrapings from the Road Department employed for this work, and unless more is done in this line before very long, the City may be called to spend a good deal of money to protect the pumping mains, which at the place above referred to, are every year in greater need of it.

The City during last year was protested by the Town of St. Henry for not having macadamized that part of Atwater Avenue between the Lachine Canal and St. Joseph Street, as it was bound to do by the act of acquisition of that Avenue from the Seminary of St. Sulpice. No complaints having been previously made by the proprietors on the Avenue, the work of macadamizing was postponed until last summer, when, on being protested by St. Henry, as previously mentioned, the work was done and the road made fully up to the requirements of the deed above alluded to.

A new bridge on the pipe track over the River St. Pierre near the wheel house will be required. As this is on the continuation of Atwater Avenue towards the pumping works and is much used as a thoroughfare, I would recommend an iron structure. which would last five or six times as long as the wooden bridge which it

is now proposed to erect, and would also be more in accordance with the permanent character of the other works in its immediate neighbourhood.

RESERVOIRS.

Only those repairs most needed, were done.

A new fence at the north west side of the McTavish reservoir, one in keeping with the other fences around the reservoirs, was put in place of the old one, which had become so dilapidated as to be dangerous.

At the Peel Street reservoir the drain pipe was partially repaired by a few lengths of tile pipe. Iron pipes will have to be substituted for the tiles, which latter are constantly breaking. It was intended to have made this substitution last year, only I thought the repairs done with the tile pipes would have been sufficient, and that further expense might be spared.

A new drinking fountain has been erected near this reservoir, at the side of the footpath opposite the keeper's dwelling in the Park.

All the wooden and iron fences round these reservoirs will require repainting.

The valve house at the McTavish reservoirs will require a new floor and the roof one coat of paint. The mast near the valve house requires to be renewed. The footpath on Pine Avenue, along the new fence has to be graded.

HIGH LEVEL SERVICE.

The pumping machinery is in good order and has needed but trifling repairs. The roof over the boiler house has been repaired but a new flag flooring is needed to replace the present brick flooring, which is worn out.

The chimney stalk which should have been repainted last year is still in want of a coat of paint this year. The engine house requires a few slates to replace those broken by the wind and the frost. The wooden cornices want repairing also.

Schedule No. 4 shows the work done by the engine, that is 43,074,684 gallons pumped into Peel Street reservoir in 2917 hours, at a cost of \$2,411.38 or \$0.256 per million of gallons raised one foot. Cost of raising one million gallons one foot high ;

PIPE LAYING.

The continuation of the 30 inch main in Sherbrooke Street East as far as Colborne Avenue and of the 24 inch main in Colborne Avenue from Sherbrooke to St. Mary street, was completed during last summer. A line of 12 inch main was laid in Metcalfe street from Dorchester to Sherbrooke street, another also of 12 inch in St. Catherine street from Metcalfe to the 30 inch pumping main on Atwater Avenue, completing the alterations to the distributing mains, contemplated in one of my reports a few years ago, with the exception of Dorchester street, West of Beaver Hall Square to the city limits.

The pipes for all these alterations were contracted for early last spring with the firm of Messrs. Bellhouse & McPherson. The contract has been well carried out, the pipes being of the best quality and well made.

This alteration to the Mains, as far as it has been accomplished, has already had the effect anticipated, viz: to maintain a better pressure in the mains in the Western part of the City. This can be seen by reference to Schedule No. 11 which gives a table of pressure as indicated by the gauges at the different fire stations, and by comparing the pressure for month of December with that for previous months. Experiments made with water pressure gauges at several parts of the city, also indicate a like result, as follows: In 1880 pressure at the Windsor Hotel was on an average 40lbs; on December 20th 1882 it indicated 50 lbs. on the gauge. In 1880 at Nos. 1155 & 1157 Dorchester Street the pressure stood at 25 lbs. and on 20th December last it was 30 lbs. At the fire station on St. Catherine street West of Guy street, it has increased from 25 lbs. to 30 lbs. The result will be still more satisfactory when the main in Dorchester Street is completed next summer. The fine weather of the months of October, November and December (the period in which most of the work was done), enabled the Department to prosecute this work rapidly and without any great difficulty.

Another alteration in the distributing mains, which was of some importance, but which had not been contemplated until last year, was the replacing of the old mains in Recollet, part of St. Peter and of St. Sacrament streets, by a new ten inch main, one end of which was connected to a twelve inch main on McGill street,

and the other to a ten inch on John street at its junction with St. Sacramento. The mains removed were originally only four inches in diameter, and had become so corroded as to be less than three inches in diameter, quite too small to furnish an adequate supply of water to the fire hydrants placed for the protection of the very valuable buildings situated in this neighbourhood. The old hydrants have also been replaced by larger ones, each able to deliver four good fire streams.

The total length of cast iron pipe laid in the city during the year 1882 is. 18487 feet, viz: 187 feet of 30 inch, 5038 feet of 24 inch, 24 feet of 16 inch, 8213 feet of 12 inch, 924 feet of 10 inch, 343 of 6 inch, 3758 feet of 4 inch and 224 feet of small iron pipe. Two 24 inch valves, one 16 inch do, six 12 inch do, four 10 inch do, nine 6 inch do, and twelve 4 inch. sixteen fire hydrants and 318 service pipes.

The location of the Canadian Pacific Railway depot at the Quebec Gate Barracks, necessitating as it did the removal of the water mains from the district south of that part of Notre Dame street from Barrack to Lacroix, inclusive, has so deranged the system of distribution as regards the maintenance, for that vicinage, of a proper fire pressure, that I consider it imprudent, that this matter should be allowed to remain longer in its present condition. The question has already been left in abeyance for over a year, in the expectation of further negotiations between the City and the C. P. Ry. Co., which might result in still further disturbance of the system of distribution. These negotiations are now interrupted and for an indefinite period. I would therefore recommend, that a ten inch pipe be laid in Bonsecours street, from Notre Dame to St. Paul and Commissioners, connecting at these streets. Another ten inch in Panet street. from the ten inch main on Dorchester to the six inch main on Water street, connecting with the mains on Craig and St. Mary streets. This would improve very considerably the water pressure in this part of the City.

MAINTENANCE OF DISTRIBUTION MAINS AND SERVICE PIPES, HYDRANTS AND PUBLIC FOUNTAINS.

For the particulars on these items I refer your Council to the report of the foreman of the water works shop, Mr. Charles Legacé, to whose immediate supervision this part of the management is

entrusted and whose report (which enters much more into details than I could do) I for the most part endorse.

I have to mention however that the expenditure on public fountains has exceeded by over one hundred per cent, the appropriation under that head. The principal cause of this was the extraordinary repairs done to the large basin in Victoria Square. This basin, the concrete bottom of which had for several years been in a leaky condition, due partly to frost and partly to the bursting of the pipes under it, was found so bad, that the old concrete had to be removed and a new bottom made. This contingency, not provided for in the estimates, arose too late to apply to your council for help in the matter, as repairs had already begun. I had therefore to curtail other items, in order to provide for this quasi unforeseen expenditure. This basin is now in good order and will, I hope, last as long as the old one did (about twenty years) without any more than the usual yearly repairs.

SERVICE PIPE INSPECTION

The service pipe inspection has been continued with more regularity than formerly by the addition of a third man. More houses have therefore been visited during the year, nearly one-third more cases of leaky water fixtures being reported and repaired. The following were reported in bad order. 947 bib cocks, 64 urinal cocks, 454 ball cocks, 28 stop cocks, 32 closet valves, 105 closet cocks, 90 basin cocks, 36 water closet wire pulls and 631 pipes burst or otherwise defective, forming a total of 2387 leaky water fixtures, against 1752 in the year previous.

WATER METERS.

The inspection of water meters has been kept on with the same regularity as in the preceding year. As this inspection is of great importance to the revenue (the amount collected last year for metered water was \$57,216) too much care cannot be given to the maintenance of the water meters in efficient working order. This can only be done by frequent inspection and by using only meters of the most approved make. The number of water meters now in use as shown in schedule No. 8 is 370 of which number 307 belong to the City and 63 to private parties. Besides this 250 are on hand at the workshop, most of them being more or less out of repair.

In 1876.	\$0.240
1877.....	0.253
1878.....	0.355
1879.....	0.283
1880.....	0.274
1881.....	0.226
1882	0.256
Average of seven years.....	0.269

CONSUMPTION OF WATER.

The total amount of water pumped during the year has been 3,491,866,933 gallons, as shown by schedule No. 7. making a daily average of 9,566,757 that is 39,538 less than the daily average of last year. Of the above there have been 35,883,923 gallons furnished to outside municipalities, 542,158 gallons for flushing sewer and flooding rinks, 1,814,000 gallons for fires, 20,767,670 for watering streets and about 17,600,000 for public fountains. It is to be noticed that with a decrease for 1882 of 39,538 gallons in the daily consumption as compared with that of 1881 there is an increase in the revenue from water rates amounting to \$9898.60. This would tend to show on the one hand greater diligence in the water department, in supervising water fixtures and on the part of the citizens more care to avoid waste of water, and on the other hand an increase of population and of business.

ADMINISTRATION.

The total expenditure on the administration has been \$68,189.31 out of an appropriation of \$70,000, leaving an unexpended balance of \$1,810 ⁶⁹/₁₀₀. There has been over expenditure in some items and an under expenditure in others. For instance in the items of wheel house and engine house the under-expenditure in the latter nearly balances the over expenditure in the former. Again the over-expenditure on the Tail Race nearly balances the under-expenditure on the Reservoirs. So with the public fountain and the pipe track, the workshop on Lagauchetière street and the distribution pipes; leaving on the whole an unexpended balance as above mentioned.

In an administration comprising such a variety of items, many of which must necessarily be unforeseen, being the result of acci-

dent, such for instance as a break of machinery or of a water main, or of earth or puddle work on an aqueduct, where water frequently tests the ability of the engineer as fire that of a fireman, it becomes very difficult to estimate closely what the actual expenditure for a given period, will be. It generally turns out that the calculations are above in some items and below in others, but the chances are that the estimated total expenditure will be exceeded, unless a large sum is put in for contingencies.

The whole respectfully submitted.

LOUIS LESAGE,

Supt. of W. W.

Montreal, February 10th 1883.

WHEEL HOUSE, January 12th, 1883.

LOUIS LESAGE, Esq.,

Superintendent Water Works

MONTREAL.

DEAR SIR,

In compliance with your instructions, my report for the year ending 31st December 1882, is respectfully presented.

I have much pleasure in stating that since I have been appointed, the working of all the pumps and machinery has been most satisfactory, and that discipline, harmony and good will reign in the works.

The repairs to the buildings and machinery are as follows:

The doors and windows of the entire works, as well as the roof of the boiler house and No. 3 engine house, got two coats of paint; the tramway covering also, and four of the five dwellings. The valve house of Nos. 1 and 2 engines, which were in a tumble down condition, were furnished with new foundation sills, and otherwise repaired: the wheel pits have been furnished with suitable and substantial frost-traps, the boiler house and coal shed doors were supplied with secure and proper fastenings. Some repairs have also been done to the weigh-house attached to the coal shed, which parted from the latter by the action of the frost; the brick work was repaired and secured by means of retaining bolts, and is now in good condition. That portion of the tramway in the coal shed which gave a great deal of trouble from the action of the frost has a stone foundation laid under it, and promises to be very satisfactory. The ends of the tramways next the turn tables were properly secured by bolts and iron plate fastenings. The foundation wall of the coal shed and a portion of the same of Nos. 1 and engine house were pointed. The coal shed will require painting out-side next summer, which is the only repair necessary. Nos. 1 and 2 engine house requires no repairs except the painting of the

No. 3 ENGINE HOUSE.

The basement of this building had two 10in. drain pipes put in, also a new flooring of red pine, with a grating for carrying away the drainage water from the pump cylinders. The outside foundation wall, as well as the inlet covering, was securely puddled to prevent the surface water from flowing in the basement. The water closet was also overhauled and put in a serviceable condition. A drinking tap and wash stand were also put up; a new door-way has been broken through from the boiler house into No. 3 engine house basement, which greatly adds to the cleanliness of the engine room. The building is now in good order, and will not require any repairs during the ensuing year.

No. 1 WHEEL HOUSE.

A leak having sprung in the foundation wall of this building, on the basin side under the flume, its condition has been temporarily remedied, and will require further attention at a more opportune time. The bulk head masonry of this building was pointed as well as the mason work around the inlet pipe. The floor is in a bad condition and has been kept together by constant patching. I would therefore recommend that a new floor be laid next spring, and that the interior of the building get two coats of paint.

Nos. 2, 3 AND 4 WHEEL HOUSE.

This building underwent no repairs except the frost traps before mentioned. The roof will require painting. A complete set of double windows is absolutely necessary, the present ones have been in use since the building was put up; their condition is so bad that they cannot be handled without breaking the glass. The timbers of the head gates grating of No. 2 wheel has been renewed. It will be also necessary to renew the timber of Nos. 3 and 4 wheels grating, as also the platforms of the same.

MACHINE SHOP.

The machine shop and machinery are in good order, with the exception of the bevelled gears driving the upright and main shaft. I would recommend that they be replaced by a mortice wheel and

pinion ; also that the shop be supplied with a complete set of spira
drills and chuck to suit. A complete set of leather belts will be
necessary as the old ones are worn out.

THE BRASS FOUNDRY.

This building is also in good order, and from present
appearances will require no outlay during the ensuing year.

THE DWELLINGS.

The only repairs necessary to these buildings is the renewing
of the skylight frames and windows, the present ones are no longer
serviceable as they admit the rain, which damages the ceiling. A
few window fastenings are also necessary.

The footpath in front which is about eighteen years old, is in
a rotten condition and should be renewed. The brick work of the
sheds in rear will require some little repairs and the back gallery
and stairs should be painted.

THE GROUNDS.

The grounds received some attention in the shape of being
more properly laid out and the planting of one hundred and twenty-
five shade trees, and they promise to present an appearance more
in keeping with the works than heretofore. I should like to be
furnished with a lawn mower, so that the grass could be kept in
trim. As the works are visited during the summer months by a
large portion of the travelling public together with quite a number
of respectable citizens, I would recommend the erecting of a com-
bined horse trough and drinking fountain in some convenient place
for their accomodation, the want of which has been long felt.

The bridge spanning the St. Pierre River on Atwater avenue
is in a dilapidated condition ; it is kept in position by means of
temporary upright posts ; as this is the principal approach to the
works I would recommend that it be replaced by a new one, as soon
as practicable.

WHEEL No. 1.

The repairs to this wheel consist of renewing two of the pump
valves and seats, the taking up of the stay bolts and the better securing
of the same. The pumps, chests, pipes, wheel casing and flume

were painted; the journals, connections and other parts received all required attention, and are now in good order. It will however be necessary, during the coming year to remove two more of the pump valves and seats and replace them with new ones, which are on hand partly fitted.

WHEEL No. 2.

The upright arms of this wheel have been working loose for a considerable time, and will require a new set of gibs and keys to replace the present ones, which are worn out. The reflux valve, which was in a leaking condition, has been readjusted, and furnished with two suitable hinge bolts; the joint in rear will require remaking next summer. A foot valve, brass bush, and one iron guide pin have been removed and replaced with new ones, also two broken gibs and keys. I would recommend that the pump tanks of Nos. 2 and 3 wheels be furnished with copper wire gratings, to further trap the floating matter from getting into the pumps.

WHEEL No. 3.

No repairs have been done to this wheel, with the exception of the putting in of four joint bolts and the tightening of one of the joints between one of the pump barrels and the valve chest. The cast iron crank on the out end of the shaft was cracked several years ago, and is still working in the same condition. I have had a duplicate made to replace it in case it shows further signs of weakness; it will be necessary during the ensuing year to remove the large bevelled wheel on the counter shaft and replace it with another which is ready on hand.

WHEEL No. 4.

This being a new machine, only the ordinary repairs have been done to it, with the exception of the inlet pipe grating, which was found collapsed from some undue pressure. It was replaced by a more substantial one and is now in good order. The crown brass of one of the pump connecting rods is cracked, a duplicate is cast ready to replace it when necessary.

ENGINES Nos. 1 AND 2.

These engines did not make a revolution since September 1877, and I believe were then reported in good order, ready for service; they are in the same condition now that they were left then, as they did not work since.

ENGINE No. 3.

The repairs to this Engine were very trifling. A portion of the Cylinder drain pipe was renewed, also twenty pump valve springs. The usual setting up of the piston rings and the packing of the air pumps was all the attention it required, and is at present in good order and not likely to require more than the ordinary attention during the ensuing year.

The boiler feed pump underwent some repairs in the shape of readjusting the valves and refitting the piston rings; it is now in good order. All the pumps have been furnished with the gearing necessary for applying the indicator, and cards have been taken with the most satisfactory results.

THE BOILERS.

The boilers, connections and mountings were thoroughly overhauled. One battery of the cornish boilers had their returned flues altered at the suggestion of the City Boiler Inspector, who represented that it would effect a saving in fuel, the correctness of which has not yet been established for the want of an opportunity to make a test, the engine having so far been required for short runs only; this will be attended to as soon as possible. The main steam pipe connecting the engine with the cornish boilers being elevated at both ends collected the condensed water, necessitating the blowing off, and waste of the same, thereby causing considerable loss in fuel; this I have remedied by means of a pipe connecting the steam pipe with the boilers, through which the hot water returns back to the boilers instead of being blown off to loss. After the boilers were overhauled and the connections repaired, they were inspected by the Boiler Inspector, Mr. Champagne, who complimented me on their condition; I would simply add, they are at present in the highest possible state of efficiency.

THE PORTABLE STEAM PUMP AND BOILER.

This machine underwent considerable repairs: the valves were readjusted, the joints remade, and the pump furnished with three lengths of rubber suction hose and one length of steam rubber hose with flanges and connections to suit. The boiler was furnished with an injector, instead of the old feed pump, and the boiler waggon pole, whippletree and wheels renewed. The whole is now in first class order and ready for immediate use.

As this boiler never was tested, to my knowledge, and being several years in use, I would recommend that it be tested in order that its actual condition be ascertained ; it will also be necessary to renew the grate bars, which is the only outlay required.

The whole respectfully submitted.

I have the honor to be

Sir,

Your most humble servant,

DANIEL KEARNEY, M. E.

Don't Leave This Page

The following is a list of figures from 22 mains, hydrants and valves on the 100 ft. and 150 ft. water distribution pipes.

the earth, and where man in the neglect of part is making a mistake. We must look the earth carefully around and see what it is doing.

The Department has had considerable trouble for several years with the 12 inch main in Washington south of Canal, on account of the water coming from the spring partly to the street and partly to the main, and partly to the work having been neglected for a long time. And to remedy this, I suggest that a new main of 24 inch diameter be laid in 24 inch main, on a level 1 foot below the old one, and be joined on each joint by a 12 inch pipe, so that it would prevent the recurrence of the trouble, and be less expensive, than relaying the 12 inch main on McClellan.

[illegible][illegible]

the large district, which is shut at present, when repairs are required. I also recommend that the main pipe on Anderson street be connected to that on Dorchester street, and the 10 inch valve on Notre Dame and Place d'Armes, also 10 inch valve on St. Mary at Colborne Avenue be renewed.

The repairs to hydrants during year, were as follows : 6 hydrants split by frost, were renewed, 9 hydrants replaced by non-freezing hydrants as owing to various causes the hydrants taken out were found frozen every day during winter, and this change has been effectual, as the new hydrants replacing them have not been frozen. It would be well during the year 1883 to replace 25 hydrants, which are found frozen almost every day during winter. And I would recommend that the hydrant on corner of St. Elizabeth and Dorchester streets be connected to Dorchester street main pipe, as with its present connection, it is not of much use for fire purposes. It affords me pleasure to state, that, notwithstanding the severity of the winter, the hydrants, when required were found to be in perfect order, which speaks well for the Inspectors under whose charge they are. The usual staff of hydrant inspectors is 12 in winter, and 4 in summer. 191 hydrants were found frozen 807 times during winter of 1881-1882, against 330 hydrants found frozen 1951 times during previous year, which is a very favorable comparison, and in a great measure due to the precautions taken to prevent their freezing, also the changing of so many of the old kinds of hydrants for the non-freezing hydrant.

At present there are in the city a large number of brick chambers, for the purpose of repairing hydrants, and as those chambers, act as a suction of cold air from street drain, they are the principal cause of hydrants freezing, and by your instructions we dispensed with several of them, by filling up the space with earth, and those hydrants up to the present, have been safe from frost, thereby showing the wisdom of your experiment.

The leaks on service pipes were as follows : 76 leaks on couplings, the most of the leaks in couplings, are caused by the action of frost, lifting the old wooden stop water boxes from opposite cock, and turning cocks in feeling for it sometimes strike their key on those couplings). 10 bows were changed for 3 way cocks. There were 637 wooden stop water boxes renewed by putting iron boxes instead, and those iron boxes, especially the improved ones, are a decided success in many ways. But there still is room for improvement, as in the spring of the year, when the frost is leaving the ground, the action of the earth raises the

box over sidewalk, making it dangerous to trip against, and if some remedy could be devised whereby this danger could be overcome, it would be another point in its favor. During the year we had to dig about 8 of these iron boxes, principally on account of the washer on rod in box becoming rusted and immovable, but latterly the washer has been dispensed with, therefore I hope it will not occur again. Sometimes they are dug on account of their being filled with pieces of stone, wood or iron which cannot be removed except by digging the boxes out.

There have been during the year: 251 service pipes reported frozen, of this number 5 were frozen outside, 96 frozen inside cellar, and 159 frozen in foundation, the sole cause of this arises from the neglect of tenants to keep their cellars secure from frost, and their attention is drawn to it only when water in pipes becomes frozen. This causes considerable trouble and expense to the department and I trust that some means will be taken to compel the proper party to have stop-cock in cellar, convenient when required, and thereby save a great deal of unnecessary trouble to department, especially in winter, when stop-water boxes are deeply covered with snow.

During the past summer, one horse drinking trough was placed in Common street opposite Black's bridge, and another on Dorchester street at Dominion square. The new system adopted by you last summer to keep horse drinking troughs constantly full of water, is a great improvement, and a great saving of water is effected thereby, it consists of a neat cast iron cistern bolted on to trough, with a connecting pipe, the cistern being supplied with water, by one of "Robertson's" patent ball-cocks, and when water in trough lowers to a certain depth the ball drops, and cock remains open at full stream until it is filled. Under the old system the water had to keep discharging a stream equal to 90 gallons per hour, and at times the most part of this was running to waste, and now with the above mentioned improvement 30 gallons per hour answers the same purpose to more advantage.

The basins at Richmond square, require considerable repairs: 1st. The bottom requires a bed of fine gravel or concrete; 2nd. The 2 inch waste water pipe in at present to be taken up and a 4 inch pipe put instead of it, as the present one is always choked; 3rd. The water jets to supply basin, are not at all in keeping with the locality, and I trust that they will be replaced by something neater. The fountains and drinking taps throughout the City will require the usual repairs next spring, also a great many of the fender posts require straightening.

In concluding my report, I return to you my most sincere thanks for your valuable advice which was of great advantage to me. All the men under my charge have conducted themselves creditably and I trust they will continue to do so; and as an encouragement to them for the better performance of their duty, I hope you will recommend that their salaries be increased from the present low rate.

Respectfully submitted,

CHARLES LAGACÉ,
Foreman Water Works Shops.

No. 1—SCHEDULE SHOWING THE DUTY OF TURBINE No. 1.

MONTHS.	Time of Pumping.	Revolu- tions.	Gallons pumped.	Castor Oil.	Tallow.	Coal Oil.	Valvo- line.	Cotton Waste.	Coal for Heating.
	Hrs. M.								
IN POUNDS.									
1882									
January.....	698.30	496,533	113,956,846	78.75	.....	186.00	.....	24.68	76800
February.....	626.49	533,907	124,860,331	76.50	18.50	142.58	30.00	32.16	72600
March.....	703.60	609,147	132,611,251	87.75	65.00	165.00	.....	34.75	67050
April.....	717.45	727,298	122,846,424	83.25	.....	138.00	25.00	37.50	56420
May.....	744.00	536,224	125,872,192	96.75	.....	128.00	.....	39.00	21020
June.....	726.00	536,436	126,261,688	96.75	.....	110.50	.....	34.25	.....
July.....	730.60	611,332	142,480,156	123.50	40.00	110.50	.....	27.00	.....
August.....	636.50	817,695	120,61,945	105.75	.....	738.12	.....	28.00	.....
September.....	674.00	551,167	128,421,011	105.75	.....	153.00	.....	23.00	.....
October.....	669.40	551,788	128,566,654	68.00	16.00	18.42	.....	25.75	12150
November.....	681.45	539,607	121,725,431	78.75	90.00	189.12	.....	27.00	52270
December.....	737.15	692,437	135,042,481	67.75	.....	184.57	.....	26.00	85900
Total.....	8375.56	6,354,121	1,594,106,103	1079.75	167.50	1,821.11	65.00	366.93	442480
Last Year.....	7573.25	5,790,673	1,349,226,809	789.12	59.00	1,282.10	102.00	313.13	495020

No. 2.—SCHEDULE showing the duty of the Breast Wheel and of Turbines Nos. 2 and 3.

MONTHS.	Time of pumping.				Revolutions.				Gallons pumped.	Castor Oil.	Tallow.	Coal Oil.	Cotton Waste.
	Breast Wheel.		Turbine No. 2.		Breast Wheel.		Turbine No. 3.						
	Hrs. M.	Hrs. M.	Hrs. M.	Hrs. M.	Hrs. M.	Hrs. M.	Hrs. M.	Hrs. M.					
1882													
January. . . .	566 20	125 00	587 40		414,866	70,329	616,788	124,852,638	81.00	10.00	191.25	28.50	
February	11.50	122.40	574.20		9,337	89,070	638,859	74,660,190	108 00	.....	159.37	26.18
March.	71.40	650.40	729.00		5,551	470,299	704,567	138,116,790	123.75	.....	161.50	28.75
April	640 20	126 55	717 00		469,670	88,514	759,127	147,896,154	112.50	.....	140.25	31.00
May	716 00	38.45	733 15		534,173	28,158	782,263	150,499,606	119.25	.....	131.75	28.00
June	638.45	89.15	719.00		488,648	69,331	838,176	153,330,518	141.75	41.00	112.62	29.18	
July	610.25	385.10	725.45		496,029	266,135	796,723	176,878,450	204.75	.....	112.62	28.56
August	633.50	570.35	646.05		477,183	358,917	778,216	190,639,376	148.50	34.00	142.37	37.00	
September	432.20	562.20	560.30		317,529	351,902	655,733	155,469,256	118.00	.....	150.87	33.75
October	744.00	138.20	744.00		583,161	95,349	913,544	179,019,108	90.00	62.00	174.25	32.65	
November	659.20	34.50	712.40		509,414	27,059	870,942	154,299,016	69.75	.....	189.12	34.00
December	242.50	191.45	717.35		183,395	93,862	909,349	119,238,060	90 00	46.62	142.75	35.62	
Total.	5,967 40	3,028 15	8,166 40		4,506,910	1,999,885	9,324,692	1,764,929,172	1,407.25	196.62	1,848.72	372.59	
Last Year. . . .	5,570 30	5,002 30	1,448.05		5,769,570	3,504,581	1,740,325	1,556,281,114	848.25	95.50	1,208.98	297.71	

IN POUNDS.

No. 3.—SCHEDULE showing the Duty of St am Engine No. 3.

MONTHS.	Pump- ing Time	Revolu- tions.	Gallons pumped	Coal used, pounds		Average pressure on pump pistons	IN POUNDS.				
				For Bank- ing Fire	To raise 1,000,000 gallons.		Castor Oil.	Coal Oil.	Seal Oil.	Valvo- line.	Cotton Waste.
1882.											
January	61.50	36,258	15,808,488	85,191	13,226	75	6.7	46.37	15.31	48.00	10.00
February	157.25	99,133	43,231,381	229,070	2,870	75	9.0	40.00	13.12	96.0	17.0
March	33.15	21,907	9,139,952	45,910	5,630	75	.....	34.12	10.93	16.00	9.00
April	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
May	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
June	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
July	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
August	82.50	54,732	23,663,132	121,140	10,050	75	.....	33.37	15.31	86.00	8.00
September	134.10	91,137	39,744,452	196,870	18,780	75	6.75	40.35	8.75	72.00	19.00
October	9.30	6,671	2,908,566	17,720	3,230	75	2.35	16.00	13.12	16.00	.....
November	54.00	31,786	13,838,696	77,469	8,180	75	4.60	48.00	28.62	56.00	.....
December	147.40	101,522	44,263,592	217,260	28,639	75	11.25	49.00	17.50	112.0	21.00
Total	689.3	412,288	192,837,768	985,280	115,600	75	49.50	345.48	129.22	502.00	84.00

MONTHS.	Pumping Time.		Revolutions.	Gallons pumped.	Coal used, pounds.			Average Pressure on Pump Pistons.	In pounds.		
	H.	M.			For Pumping.	For Banking Wire.	To raise 1,000,000 gallons.		Castor Oil.	Valvoline.	Cotton Waste.
1892											
January	219	05	244,146	2,329,752	34,426	6,561	13,990	100	4.00	83.00	3.50
February	201	00	212,680	2,552,160	30,433	5,730	14,248	100	3.00	59.00	2.50
March	211	20	244,297	2,931,594	32,669	6,513	13,366	100	3.00	32.00	7.00
April	213	15	227,020	2,724,240	30,784	5,347	13,252	100	4.00	12.00	6.00
May	237	40	297,044	3,564,528	36,557	6,527	12,087	100	2.00	18.00	5.00
June	237	55	296,484	3,557,808	35,459	5,957	11,611	100	2.00	19.00	6.00
July	276	10	356,961	4,283,532	40,836	6,488	11,048	100	3.00	28.00	4.00
August	302	05	382,281	4,587,408	44,183	7,080	11,175	100	4.00	23.00	3.00
September	236	00	297,901	3,574,812	42,397	5,986	13,534	100	4.00	20.00	5.00
October	272	05	368,556	4,422,672	42,593	6,852	11,180	100	2.00	18.00	2.00
November	231	40	328,207	3,938,484	40,219	6,114	11,764	100	3.00	18.00	3.00
December	258	40	333,977	4,007,724	42,654	6,203	12,193	100	2.00	18.00	3.00
Total	2916	55	3,581,557	43,071,624	453,420	75,358	12,276		36.00	356.00	50.00

No. 5.—SCHEDULE showing the depth of Water and Evaporation at ~~the~~
McTavish Street Reservoir for the year 1882.

MONTHS.	Average monthly Depth.	Rain Gauges, in inches.				Evaporation in inches.
		Rain.	Snow.	Snow- reduced to Rain.	Total Rain.	
1882						
January	22.57	0.38	24.37	1.93	2.31	.43
February	22.53	0.25	25.50	2.05	2.30	.64
March.....	22.00	1.98	13.00	1.27	3.25	.06
April.....	22.79	0.20	2.00	0.18	0.38	.66
May	22.74	0.96	.....	.....	0.96	.12
June	22.46	4.47	.....	.....	4.47	.36
July	22.24	4.92	.....	.....	4.92	.15
August.....	20.58	1.77	.....	.....	1.77	.27
September	20.96	3.39	.....	.....	3.39	.89
October	21.97	0.97	.....	.....	0.97	.38
November	22.31	1.23	1.00	0.10	1.33	.73
December	22.15	.....	34.75	2.84	2.84	.37
Total.....	.....	20.52	100.62	8.37	28.89	.06
Last Year .....	.....	20.09	54.39 $\frac{3}{4}$	6.91	27.00	.79

No. 6.—Repairs to Mains, Hydrants and Valves during 1882.

SIZE.	12"	10"	6"	4"	Hydrant valves renewed.	Old kind Hydrants replaced by patent ones.	Hydrants renewed.	Hydrant Rods broken.
Number of times mains broken.....		1	2	10				
" valve spindles renewed.....			2	6				
" joints blown out.....	23	11	8	60	54	9	6	12

REPAIRS TO SERVICES.

Couplings leaking.....	76
Wooden boxes replaced by iron ones	637
Bows replaced by 3 way cocks	10
Burst in wall.....	60

Number of places where water works plumbers were called during the winter 1881 and 1882.

Pipes choked.....	30
Frozen outside.....	5
Other causes.....	3
Frozen inside.....	96
" in wall	159
Total.....	293 times.

Number of patent hydrants, in position in City, up to
January 1st. 1883..... 106

Hydrants frozen winter 1881-82. 191..... 807 times.

No. 7 — COMPARATIVE TABLE showing the average Daily Consumption for each month and for each year, in the City of Montreal.

	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
January.....	7,290,852	7,095,986	8,384,520	8,862,518	8,753,185	8,483,438	8,711,520	8,675,067	9,548,641	8,269,612
February.....	7,063,017	7,869,775	8,722,379	9,388,035	9,492,078	8,744,908	8,825,552	8,892,987	9,126,537	8,689,932
March.....	7,012,675	7,744,778	8,648,153	10,538,483	8,540,736	8,823,375	9,082,027	9,430,162	9,009,366	9,028,616
April.....	7,279,311	8,410,697	8,677,975	9,544,695	8,450,236	8,679,603	9,198,983	9,098,194	9,147,791	9,024,754
May.....	6,833,600	7,523,392	8,843,682	8,686,748	8,819,552	8,253,495	9,279,563	9,132,068	9,058,872	8,915,219
June.....	7,865,951	7,449,288	9,342,653	9,734,198	9,709,864	9,773,318	9,487,630	10,238,352	9,674,104	9,386,071
July.....	7,786,051	9,039,422	9,361,989	10,527,499	10,074,892	10,337,277	10,025,080	10,574,083	10,423,298	10,305,116
August.....	8,563,739	9,452,456	8,391,686	10,989,611	10,039,791	9,910,444	10,312,233	11,197,648	10,548,459	10,811,241
September.....	7,055,885	8,995,643	9,065,770	10,026,061	9,615,654	9,112,694	9,753,752	10,720,280	10,981,133	10,787,851
October.....	9,168,172	8,561,262	8,614,050	10,141,385	8,234,079	9,663,896	9,034,211	10,131,764	10,285,658	10,015,944
November.....	6,862,111	7,974,388	8,821,966	9,995,249	7,844,593	9,116,044	8,270,213	9,230,500	9,093,571	9,796,267
December.....	7,017,387	8,395,810	8,547,777	8,770,611	8,183,582	8,191,048	8,169,285	9,046,544	8,350,180	9,727,230
Daily average for each year.	7,399,800	8,209,408	8,785,217	9,766,261	8,979,512	9,091,131	9,177,504	9,691,901	9,606,296	9,569,755
Incr. over Decr. from } pre- } ced } ing } year.....	734,670	809,602	575,809	981,044	.....	111,619	86,373	514,397	.....	39,
	.....	.....	.....	.....	789,749	.....	.....	.....	85,606	.....

No. 8.—SCHEDULE showing the different kinds and sizes of Water Meters belonging to the City and to private parties.

KINDS.	Size in Inches.	Property of the City.				Private Property.				Grand Total.
		In the City.	Outside the City.	At the Work Shop.	Total.	In the City.	Outside the City.	At the Work Shop.	Total.	
m	10		1		1					1
	6	2	2	1	5					5
	4	10	2	1	13					13
	3	9	1	2	12	6			6	18
	2	26		5	31	8			8	39
	1½	8		4	12	6			6	18
	1	4		9	13	4			4	17
	¾	11		9	20	6		1	7	27
	½	16		59	75	2		4	6	81
ion	3			1	1					1
	2	1		1	2	1			1	3
	1	26		5	31	1			1	32
	¾	100		40	140	6		1	7	147
ary Union	4			2	2					2
	3	1			1			1	1	2
"	2	1	1		2					2
"	1½	3		2	5					5
"	1	2	1		3					3
"	¾	14		4	18					18
"	½	2		1	3					3
own	3	2			2					2
	2	3			3					3
	1	11		3	14					14
	¾	10		4	14					14
	½	9		3	12					12
orthington	3	1			1		1		1	2
"	2	4		2	6	6			6	12
"	1½	3		2	5	1			1	6
"	1	7	1	4	12	1			1	13
"	¾	6		4	10	14		3	17	27
ontinental	¾	6			6					6
alsh				1	1					1
axime	1							1	1	1
"	¾			1	1					1
rovidence	¾			2	2					2
airchild	¾			1	1					1
ubin	¾			1	1					1
ewis	¾			1	1					1
Total		298	9	175	482	62	1	11	74	556

No 9.—SCHEDULE showing the Pipes, Hydrants, Valves, Services, &c., laid in the City of Montreal, during the year 1882.

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.				Wrought Iron.	Number of Valves.				Hydrants.	Houses supplied.	Length of Lead Pipes in feet.	Stop Cocks.
	30 in.	24 in.	16 in.	12 in.		10 in. 6 in. 4 in.			Total.				
						12 in.	6 in.	4 in.					
<i>East Ward.</i>													
Notre Dame.....											1	38	1
Jacques-Cartier.....											1	20	1
Commissioners.....					17						1		
Barracks.....				140	140					1	1		
Champ-de-Mars.....				54	54					1	1		
Total.....				194	194	17			2	2	5	58	2
<i>Centre Ward.</i>													
Fortification Lane.....											1	33	1
<i>West Ward.</i>													
Notre-Dame.....											2	56	2
Recollets.....			505		505						2		
St. Sacrament.....			245		245						1		
St. Peter.....			174		174						1		
St. Paul.....											1		
Craig.....											1	22	1
Port.....						28					1	26	1
Fortification.....						17					1		1
Total.....			924		924	45			3	3	6	104	6

SCHEDULE showing the Pipes, &c., laid down.—Continued.

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.					Wrought Iron.	Number of Valves.				Hydramts.	Houses supplied.	Length of Lead Pipes in feet.	Stop Cocks.
	30in	24in	16in	12in	6 in. 4 in. Total.		24 in	16 in	12 in	6 in. 4 in. Total.				
<i>St. Anne Ward—C't.</i>														
Brought forward.			5040		51 1818 6912				4		2 5 11 10	34	1717	36
Durocher														
Scotland												2	58	2
Cathcart												1	49	2
Chomedy												1	11	1
Desrivieres,												1	31	1
Aqueduct					234 234							16	228	4
McCalfe			2525		2525				2			1	40	1
Dorchester										2				
St. David Lane.												2	30	2
St. Mark												4	47	2
Versailles												4	137	4
Dominion												1	5	1
McGill College Av.												4	37	2
St. Martin												1	46	1
McGill						22						6	94	3
Seigneurs												1		1
Mountain						91						6	132	4
Windor					414 414							1		1
Tupper										1	1			
St. Monique			618		618							2	62	2
Montney					36 36							1		1
												2	27	1

Letour Beaver Hall Inspector	8219	512502	10760	113	6	7	15	11	30	2519	70
Total											
St. Lawrence Ward.											
Sherbrooke.....									3	81	3
Bleury.....									4	120	4
Guilbault.....									1	34	1
Anderson.....									8	212	4
Mance.....									3	111	3
Craig.....									1	34	1
Milton.....	189								2	27	2
Balmoral.....									3	39	2
Ontario.....									1	35	1
Mignonne.....									1	15	1
St. Famille.....									1	53	1
Berthelet.....									1	47	1
Arade.....									2	67	2
Total	189		189						31	878	26
St. Louis Ward.											
St. Dominique.....									2	36	1
St. Lawrence.....									2	49	2
Ernst.....	500		500						2	62	2
St. Denis.....									2	172	2
Fortier.....									4	92	3
Cadeux.....									2	116	2
Carried forward		500	500						14	527	12

Showing the Pipes, etc., laid down—Continued.

Name of S. or W.	Total	Number of Valves										Hydraulic	Houses supplied	Length of Lead Pipes in Feet	Brass Stop Cocks
		1/2 in.	3/4 in.	1 in.	1 1/4 in.	1 1/2 in.	2 in.	3 in.	4 in.	6 in.	8 in.				
St. Louis Ward, Co.															
Brought forward	540	500											14	927	12
St. Elizabeth	00	00											0	103	0
Emery	00	00											4	02	0
Market Square	00	00											1	50	1
St. Hypolite	00	00											0	30	1
Total	540	500											20	778	10
St. James Ward.															
Beaudry	00	00											4	07	0
St. Hubert	00	00											0	201	0
Ontario	00	00											0	09	0
St. Christophe	00	00											0	009	0
Jacques Cartier	00	00											10	00	0
Berli	00	00											1	03	0
Sherbrooke	243	243											103	00	0
St. Mary	144	144											1	30	0
Montana	00	00											1	10	0
Wolfe	00	00											2	00	0
Visitation	00	00											0	00	0

SCHEMATIC showing the Pipes, &c., laid down.—Continued.

RECAPITULATION.

NAMES OF WARPS.	Length in feet of Cast Iron Pipes.				Wrought Iron.	Number of Valves.						Hydraulic.	Hoses supplied.	Length of Lead Pipes in feet.	Stop Cocks Brass	
	30 in	24 in	16 in	12 in		10 in	6 in.	4 in.	Total.							
East.....			194	191	17				2	2			5	58	2	
Centre.....													1	33	1	
West.....			924	924	45			3		3			6	104	6	
St. Ann's.....				100												
St. Antoine.....			8213	54 2562	10769	113		6		2	7	15	11	96	2540	70
St. Lawrence.....				189										31	878	26
St. Louis.....				535										26	778	19
St. James.....				387										65	1901	44
St. Mary's.....	187 50' 38"	21		100 40	5389	49	2	1		1	7	3	14	53	1240	30

MONTHS.

	At W. Works Lagrangeville corn of St. Bourne	Central Fire St Centre street.	Fire Station No. St. Gabriel stre.	Fire Station No. Wellington st.	Fire Station No. 4. Chaukolleez Sq.	Fire Station No. 5. St. Catherine st.	Fire Station No. 6. Ontario street.	Fire Station No. 7. Dalhousie Sq.	Fire Station No. 8. Craig street.	Fire Station No. 9. Centre street.	Fire Station No. 10. St. Catherine st.	Fire Station No. 11. Ontario street.	Fire Station No. 12. St. Simeon st.
1882													
January	65.00	75.00	.....	75.00	74.00	50.00	65.00	.....	65.00	67.00	25.00	54.00	65.00
February	65.00	75.00	.....	75.00	73.00	50.00	60.00	.....	64.00	67.00	25.00	54.00	65.00
March	65.00	75.00	.....	75.00	73.00	56.00	69.00	.....	64.00	67.00	25.00	55.00	65.00
April	65.00	75.00	.....	.....	74.00	50.00	60.00	.....	64.00	67.00	25.00	54.00	65.00
May	65.00	72.00	.....	75.00	73.00	50.00	60.00	.....	63.00	67.00	25.00	54.00	65.00
June	65.00	75.00	.....	75.00	73.00	50.00	60.00	.....	64.00	68.00	25.00	55.00	65.00
July	65.00	75.00	.....	75.00	72.00	50.00	60.00	.....	64.00	67.00	25.00	54.00	65.00
August	65.00	75.00	.....	75.00	70.00	50.00	60.00	.....	63.00	75.00	25.00	56.00	65.00
September	65.00	73.00	44.00	.....	70.00	47.00	60.00	.....	63.00	70.00	25.00	59.00	65.00
October	65.00	71.00	45.00	75.00	71.00	47.00	60.00	.....	63.00	70.00	27.00	59.00	65.00
November	65.00	75.00	45.00	75.00	76.00	54.00	60.00	.....	66.00	70.00	30.00	59.00	65.00
December	65.00	75.00	46.00	73.00	74.00	54.00	60.00	.....	70.00	70.00	30.00	59.00	65.00
Average	65.00	74.00	45.00	75.00	73.00	50.00	65.00	.....	64.00	69.00	26.00	56.00	65.00
1881	65.00	73.00	49.00	75.00	72.00	46.00	60.00	55.00	64.00	66.00	25.00	55.00	65.00

SCHEDULE No. 12.

TABLE showing the positions of Public Fountains erected in the
City of Montreal, up to 1883.

No.	LOCALITY.	Cast Iron Basins.	Stone and Ce- ment Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.
1	Beaver Hall Square.....				1			2
2	Bleury and Dorchester.....			1				1
3	Bonsecours Market.....					2		2
4	Chaboillez Square.....						1	1
5	Colborne near Flour Sheds.....				1		1	2
6	Court House Square.....	2	1	2				5
7	Craig at Victoria Square.....			1			3	1
8	Craig and St. Lambert's Hill.....				1		1	1
9	Dorchester and Dominion Sq.....				1		1	1
10	Dorchester and Visitation.....					1		1
11	Grey Nuns and Common.....						1	1
12	Guilbault and St. Lawrence.....				1		1	2
13	Hay Market and College street.....					1	1	1
14	High Service Reservoir.....				1			2
15	J.-Cartier Sq. and St. Paul st.....	1			1		1	4
16	King's Basin.....						1	1
17	Merchants' Wharf.....						1	1
18	McTavish st. at Reservoir.....				1			1
19	Military Basin.....						1	1
20	Mill at Waste Weir.....					1	1	2
21	Ontario and St. Denis.....					1	1	2
22	Ontario and Papineau Road.....					1	1	2
23	Papineau Sq. and Craig.....					1	1	2
24	Philipps Square.....				1			1
25	do and St. Catherine.....						1	1
26	Place d'Armes.....	2	1					5
27	Prince and Common.....				1		1	2
28	Queen's Basin.....						1	1
29	do.....							
30	Richmond Square.....		2		1			3
31	Seigneurs and Basin.....				1		1	2
32	Sherbrooke, near Drummond.....				1		1	1
33	Sherbrooke and Guy.....				1		1	1
34	St. Ann's Market.....					2		2
35	St. Antoine Market.....				1		1	2
36	St. Catharine and Papineau Road.....				1		1	2
37	St. Gabriel Market.....				1		1	2
38	St. Mary near Suzanne.....				1		1	2
39	St. Thomas and Ottawa.....					1	1	2
40	Victoria Sq., south of Craig.....		1	2				3
41	do north of Craig.....	3						4
42	Viger Sq. Basin No. 1.....		1					1
43	do No. 2.....		1					14
44	do.....			1	1			2
45	Viger Market.....					2	6	6
46	Wellington and St. Patrick.....					1	1	2
Total.....		8	7	7	15	18	36	106

Removed fall of 1881.

Removed summer of 1881.

SCHEDULE No. 12.—*Continued.*

At Exhibition Grounds, St. Catherine Road.	Cast Iron Basins.	Stone and Ce- ment Basins.	Stone Fountains, Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.	
Opposite Crystal Palace..	1	.....	.....	17	North side.
At Horse Ring.....	2	"
Distributed over grounds.	12	12	"
For Ice Water....	2	.....	8	"
St. Urbain str. and Monnt. Royal Avenue.....	1	1	"
Bleury street and Mount Royal Avenue.....	1	1	"
Opposite Agricultural Buildings.....	1	.....	1	
Distributed over grounds for fire purposes.....	4	North & South [side.
Total.....	3	14	46	

PIPE TRACK.

Repairs to valves and valve chambers. .	77 53	
" Tunnel on Atwater Avenue	1267 31	
	<hr/>	1344 84

RESERVOIRS.

Guardians salary.....	700 00	
Repairs to valve house and fences....	77 34	
Fuel and light.....	177 34	
Sundries	80 22	
Fence on Pine avenue.....	260 00	
Upper Level Reservoir, Care taker & sundries	174 81	
Upper Level Reservoir drain pipe	16 43	
	<hr/>	1486 14

HYDRANTS.

Inspecting , wages.....	3122 30	
Repairing , wages and materials.....	1441 76	
Thawing , horse and laborers.....	360 28	
	<hr/>	4924 34

PUBLIC FOUNTAINS.

Repairing , wages.....	815 01	
" materials.....	710 73	
	<hr/>	1525 74

DISTRIBUTION PIPES.

Repairs to mains, service and valves, wages	6111 92	
Thawing pipes and carting water.....	325 24	
Inspecting service pipes inside houses.	1430 00	
Repairs to footpaths and service boxes wages.....	1689 01	
Materials , iron, casting, lead, tin, &c..	286 78	
" wood, planks, nails, &c.....	504 51	
" bricks, cement, sand, &c....	102 87	
" rope, drain pipes, &c.....	20 80	
	<hr/>	10471 13 19752 19

Carried over.....

 42525 70



Brought over	22773 51
--------------------	----------

PIPE TRACK.

valves and valve chambers. .	77 53	
Tunnel on Atwater Avenue	1267 31	
	<hr/>	1344 84

RESERVOIRS.

salary.....	700 00	
valve house and fences....	77 34	
light.....	177 34	
	80 22	
Pine avenue.....	260 00	
Reservoir, Care taker &		
ries	174 81	
Reservoir drain pipe....	16 43	
	<hr/>	1486 14

HYDRANTS.

z, wages.....	3122 30	
z, wages and materials.....	1441 76	
horse and laborers.....	360 28	
	<hr/>	4924 34

PUBLIC FOUNTAINS.

wages.....	815 01	
materials.....	710 73	
	<hr/>	1525 74

DISTRIBUTION PIPES.

Brought over.....

42525 -

WORK SHOPS ON LAGAUCHETIERE ST.

Wages, foreman, clerk, turncocks, mechanics, laborers, &c.....	5874 15	
Instalment on premises.....	800 00	
Iron, spikes, nails, tin, lead, &c.....	95 28	
Timber, wood, coal oil, lamps, &c.....	94 21	
Tools, &c.....	562 85	
Rent of foreman's house.....	140 00	
Telephone and connection with Police stations.....	218 68	
Fuel and light.....	334 78	
Lathe.....	120 00	
Sundries.....	128 53	
	<hr/>	8368 48

WORK SHOP AT WHEEL HOUSE.

Wages.....	463 67	
Materials, iron, copper. &c..	9 35	
Sundries.....	55 72	
	<hr/>	528 74

METER DEPARTMENT.

Two Inspectors.....	1279 20	
Testing and repairing.....	1135 72	
Materials.....	90 55	
	<hr/>	2505 47

ENGINE HOUSE AT McTAVISH St.

RESERVOIR.

Assistant engineer and stoker.	1015 73	
Fuel for engine.....	1100 39	
Oils, tallow, &c.....	202 99	
Repairs to building and machinery....	92 27	
	<hr/>	2411 38

MISCELLANEOUS.

Contingencies for office, drawing paper, &c.....	252 78	
Postage stamps, carters, sundries.....	168 76	
Horse keep, superintendent.....	600 00	
Map for distribution pipes, draughtsman, &c.....	801 25	
	<hr/>	13814 07
Carried over.....	1822 79	<hr/>
		56339 7

Brought over.....	1822 79	56339 77
Damages	97 80	
School taxes and assessments.....	3076 25	
Providing exhibition buildings with water.....	341 28	
Grading Atwater avenue.....	765 00	
	<hr/>	6103 12

STAFF.

Superintendent.....	2800 00	
Assistant superintendent.....	2000 00	
Clerk.....	900 00	
Junior clerk.....	300 00	
	<hr/>	6000 00
		<hr/>
		12103 12
		<hr/>
Total.....		\$68442 89

LOANS.

PIPE LAYING.

Wages.....	22576 99	
Iron, lead, making lead pipes.....	4739 86	
Copper, brass works.....	1309 69	
Timber	153 85	
Bricks.....	228 55	
Drain pipes, cement, lime, &c.	353 24	
Special castings	1556 93	
Iron, cast iron pipes.....	26062 33	
Tools.....	214 73	
Packing.....	50 55	
Valve stones.....	1208 34	
Meters.....	2598 94	
A fountain.....	91 70	
	<hr/>	61145 70
		<hr/>
Total.....		\$129588 59

No. 14—Inventory of Stock on hand, January 1883.

WATER WORK'S WORK SHOP.

DESCRIPTION.	30 in.	28 in.	26 in.	22 in.	20 in.	18 in.	16 in.	14 in.	12 in.
Cast Iron Pipes, in feet (new).....	1224	0	492	5780	2584	999	27558	6192	0
Cast Iron Pipes, in feet (old).....	0	229	0	349	0	18	2078	1729	1430
Cast Iron Slip Sockets.....	7	26	0	0	32	24	34	17	22
Do Elbows.....	0	0	0	7	1	0	16	14	0
Do Double Bends.....	0	0	0	0	0	0	1	9	0
Do Caps.....	3	5	0	20	11	14	24	17	0
Do Bonnets.....	1	0	0	18	10	5	62	10	0
Do Snap Valves.....	2	1	2	1	2	0	11	1	6

Description.	30x12	30x8	30x4	26x12	26x10	26x8	26x6	22x10	22x8	22x6	20x10	20x8	20x6	18x10	18x8	18x6	16x10	16x8	16x6	14x10	14x8	14x6	12x10	12x8	12x6
Cross Branches.....	4	2	1	11	11	4	7	6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Tee do.....	8	0	1	9	10	0	0	1	5	4	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5

Description	30x30	30x24	30x24	16x12	12x12	12x10	12x6	10x10	10x8	10x6	10x4	8x8	8x6	8x4	6x8	6x6	6x4	4x8	4x6	4x4
Breeches Pipes.....	4	2	3		1	2		5							6		1			
Taper Do.....	0	7				3	8		2	13	4		11		13					

INVENTORY.—*Continued.*

Cast Iron Hydrants assorted.	26	Hydrant fender posts	11
“ Valve Covers.....	27	Pieces to lengthen Hydrants.	34
“ Hydrant Frames...	28	1 inch Iron Pipe in feet...	3000
“ “ Chambers.	56	Assorted service Boxes.....	728
“ “ Seats.....	26	Cast Iron drinking troughs.	3
Assorted Rods for Stop water Boxes .	.....		746

LEAD WORKS.

Pig Lead, in lbs	20532
1½ inch Lead Pipe, in lbs.....	685
1 Do do	26250
⅝ Do do	750
½ Do do	14865

SUNDRIES.

Assorted drain pipes, in feet	135
Valve stones.....	40
Single service stones	24
Double do do	6
Block Tin, in lbs.....	390

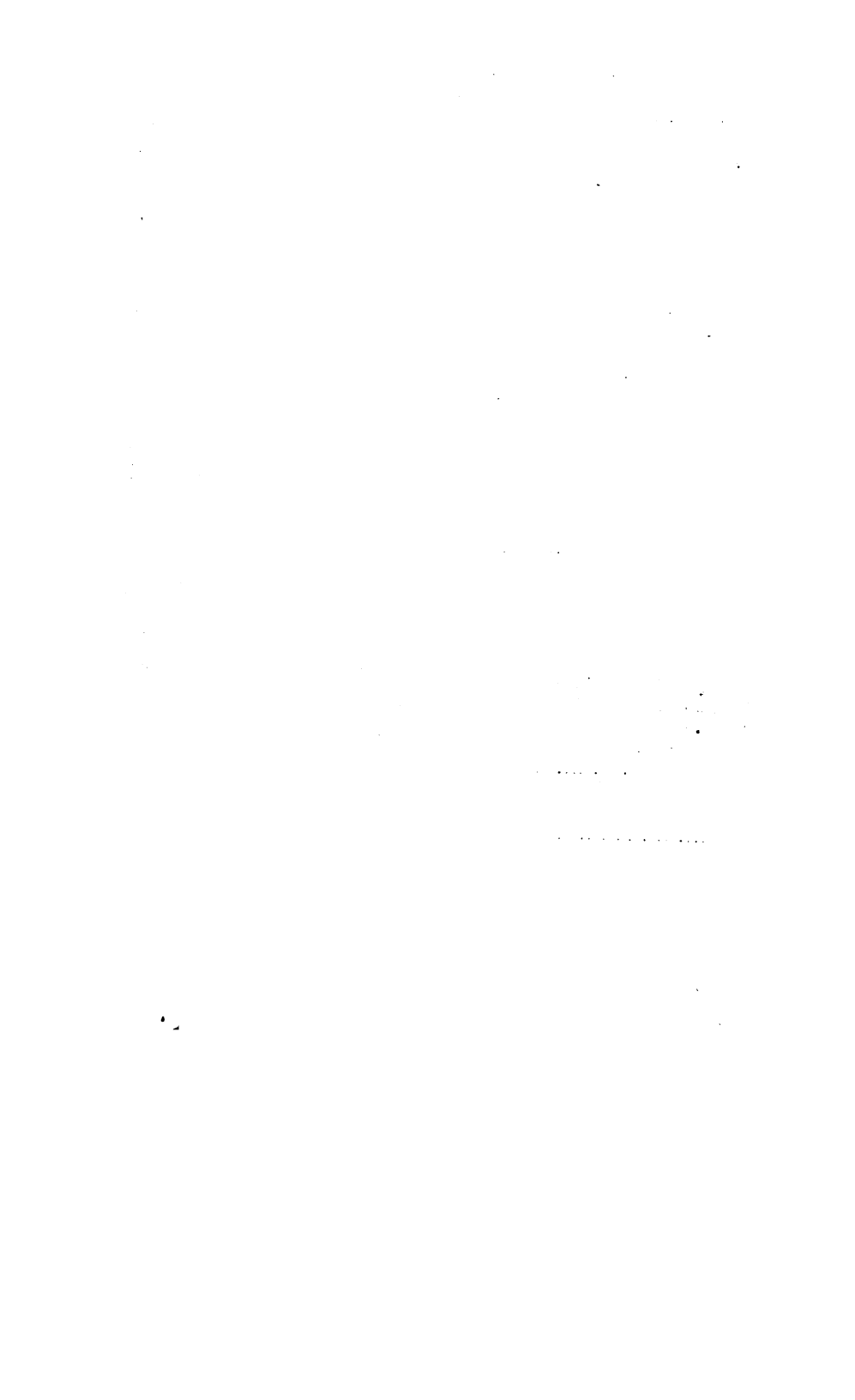
BRASS WORKS.

1 inch coupling cocks	144	⅝ inch Crosses	147
“ Do do	78	American Nozles.....	38
“ Do do	142	1½ inch tail couplings.....	6
1 “ Do Nozles	84	¾ “ “ Do	5
“ Do do	75	½ “ “ Do	12
“ Do do	1096	1 “ Union joints.	277
2 “ Cocks for iron pipes...	20	¾ “ Do	552
1½ “ Do do ...	12	½ “ Do	252
1 “ Do do ...	2	Street watering Nozles.....	400
1½ “ Do Lead pipes....	12	Hydrant Nozles.....	50
3 way Cocks	20	2 inch. Peet Valves.....	2
1½ “ Do	196	1½ “ Covers.....	21
¾ “ Do	52	1 “ Do	365
1x½ “ Tees.....	117	Assorted Spindles	33

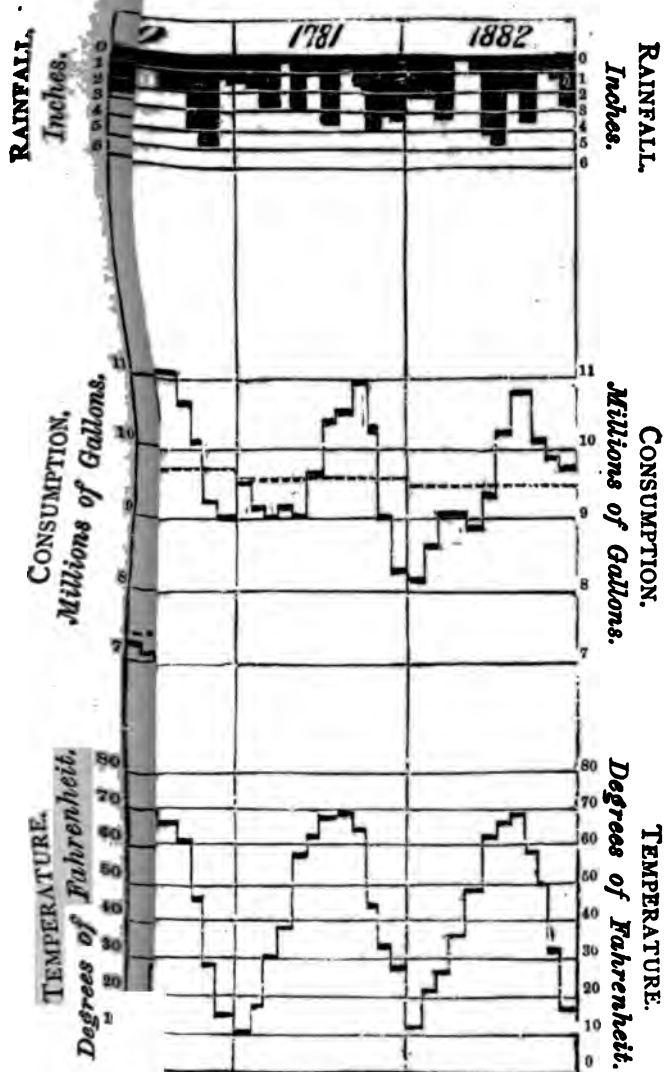
DULE shewing the number of Assessed Dwellings, &c.—*Cont.*

STORES, SHOPS, OFFICES, &c.

Tenanted.	Vacant and not supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
			5217	4919	298	
428	27	4 00	41	38	3	50 00
486	29	5 00	14	14	....	54 00
1043	79	6 00	1	1	....	55 00
289	20	7 00	21	21	....	58 00
319	24	8 00	2	2	....	60 00
149	7	9 00	33	31	2	62 00
564	41	10 00	18	17	1	66 00
34	1	11 00	6	6	....	70 00
218	12	12 00	18	18	....	74 00
43	1	13 00	34	33	1	82 00
304	13	14 00	3	3	....	90 00
18	1	15 00	2	2	....	94 00
78	3	16 00	9	9	....	98 00
19	....	17 00	10	8	2	102 00
205	16	18 00	6	6	....	114 00
1	....	19 00	7	7	....	122 00
56	....	20 00	1	1	....	126 00
7	....	21 00	1	1	....	128 00
155	11	22 00	3	3	....	130 00
1	....	23 00	1	1	....	138 00
39	1	24 00	1	1	....	142 00
1	....	25 00	5	5	....	162 00
127	8	26 00	1	1	....	180 00
14	....	28 00	1	1	....	194 00
62	1	30 00	3	3	....	202 00
10	....	31 00	1	1	....	226 00
13	1	32 00	4	4	....	242 00
1	....	33 00	2	2	....	258 00
92	1	34 00	1	1	....	282 00
10	....	36 00	2	2	....	322 00
34	1	38 00	1	1	....	342 00
1	....	40 00	1	1	....	362 00
1	....	41 00	1	1	....	482 00
83	....	42 00	1	1	....	642 00
14	....	46 00	1	1	....	722 00
4919	298		5474	5167	352	



Rainfall, — and mean Temperature 1882.





ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

Montreal Water Works

FOR THE

YEAR ENDING 31st DECEMBER, 1883.

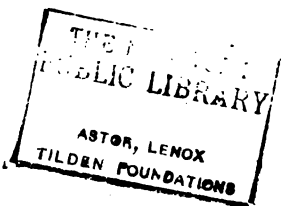
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Montreal :

LOUIS PERRAULT & Co., CITY PRINTERS, 87 ST. JAMES STREET.

1884



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ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

in:pliments of

Louis Lesage,

Superintendent Montreal Water Works.



Montreal :

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1884

ANNUAL REPORT
OF THE
SUPERINTENDENT OF THE MONTREAL WATER WORKS,
FOR THE
YEAR ENDING DECEMBER 31st 1883.

To the

*Mayor, Aldermen and Citizens of the City
of Montreal.*

GENTLEMEN,

I beg leave to submit for your consideration my annual report on the several works connected with the water Department, for the year ending 31st December 1883, with the following Schedules attached hereto, in reference to the same.

1. Schedule showing the duty of Turbine No. 1.
2. Schedule showing the duty of Breast Wheel and of Turbines Nos. 2 and 3.
3. Schedule showing the duty of Steam Engine No. 3.
4. Schedule showing the duty of High Level Service Engine.
5. Schedule showing the Depth of Water, the Rain Fall and the mean monthly temperature at the McTavish Reservoir, for the year 1883.
6. Repairs to Mains, Hydrants, Valves and services during the year 1883.
7. Comparative table showing the average daily consumption for each month and for each year from 1874 to 1883.
8. Schedule showing the different kinds and the sizes of Water Meters belonging to the City and to private parties.
9. Schedule showing the Pipes, Hydrants, Valves, Services, &c., laid in the City during the year 1883.

- No. 10. Schedule showing the Pipes, Hydrants, Valves, Services, &c, laid in the City of Montreal up to 31st December 1883.
- No. 11. Schedule showing the average pressure in the City Mains during the year 1883.
- No. 12. Table showing the positions of Public Fountains erected in the City of Montreal up to 1884.
- No. 13. Statement showing the various details of the expenditure in the management of the Montreal Water Works Department for the civic year ending 31st December 1883.
- No. 14. Inventory of Stock on hand, January 1884.
- No. 15. Schedule showing the number of Assessed Dwellings, Stores, Shops, Offices, Warehouses, Manufactories, Hotels, &c., in the City of Montreal, for the year 1883—1884 with the Assessed value thereon.
- No. 16. Cash receipts by the Water Department during the civic year ending 31st December 1883.

AQUEDUCT.

The Aqueduct has been maintained in an efficient state of operation during the past year. Most of the repairs contemplated in my last annual report have been done. Amongst these were the cleaning of the side ditches, where such cleaning was most needed; the repairs to the slopes where slides had occurred, the cleaning of berm ditches, the pointing of the joints of masonry of bridges and culverts, the ordinary repairs to farm bridges, the alterations to keepers' house at the rock gates, &c.

A good deal more of these repairs might have been done had there been enough money at the disposal of the Water Committee, but as there is required every year a certain sum for this purpose, it is proposed to continue the work gradually by making those repairs which are most pressing. Some portions of the original fences, such as those along the farms of Vallier, Pigeon, Decarie on the North West side of the aqueduct, and those along the Greenshields and Hadley farms require to be renewed. The ditches along the Frazer and Dumberry farms, with the culvert at that section, want cleaning.

Those also on the South East of the Aqueduct along the farms of Boyer, Crawford, Greenshields, Hadley, Stephens, Cross, Reeves, Mann and Brault will require a general overhaul as they have not been cleaned for several years.

Several of the farm bridges and some of the crib abutments require attention. The stone abutments of the bridge near the settling basin have been disturbed by frost and threaten to fall into the Aqueduct. They will require to be set right.

The culvert under the old Aqueduct to which I referred in my previous report, is in the same condition as there described and should be attended to if not this year at latest next. These, with some painting to be done to woodwork and repairs to earth works that may be damaged by this winter's frost, constitute the position of the work which it is contemplated to do next season.

WHEEL HOUSE AND PUMPING WORKS.

A good deal of work which was not provided for in my estimate under this head, some of which was unforeseen, oblidged the Water Committee, towards the end of the year to ask for a supplimentary appropriation. This was necessitated principally to meet the cost of repairs to the foundations of the buildings and the unusual repairs to the Engines Nos. 1 and 2 which have been left idle since 1877 under the impression that they were in good working order.

The report of the Chief Engineer D. Kearney, which I have attached to mine, give a full and detailed account of all the work done during the year, to the pumping machinery and buildings under his care. It also gives certain suggestions for improvements. In all of which I concur.

By this report it is seen that a great deal of work has been done and a good deal also is requisite, to which I do not think it necessary here to allude in detail.

The pumping machinery has been maintained in good working order, in spite of all the repairs done to it, but the buildings of the wheels will require yet more to be done to their foundations in order to protect them from further injury. Means must be taken to prevent the rain water from the roof, damaging the walls, and the coping of the bridge on the tail race side of the Wheel House, having been thrown out of plumb by the action of the frost, will require resetting.

The high pressure steam engine auxillary to the Turbine Wheel No. 1 has been removed and placed under shelter, ready to be disposed of to any purchaser who may offer for it. So far no offer has been received.

I am happy to report that the operations at the work shop are

very satisfactory and continue to be of great importance to the City, as much for the prompt repairs done to the pumping machinery as for the street valves, fire hydrants, water meter repairs, brass works, all of which are done here, and which tax the capacity of this shop to its utmost limit. The following is a list of the principal new work turned out :

36 fire hydrants, 55 bolts and nuts, 12 hydrant sockets, 1 hydrant nozzle, 1 hydrant cut off, 5 eight inch sockets bored, 2 four inch pipes bored, 5 twelve inch, 9 ten inch, 11 six inch, 28 four inch valves, 15 brass valve-spindles, 2 one and $\frac{1}{4}$ inch angle iron frames for inlet grating of wheels Nos. 2 and 3, 90 grate bars, 72 clicks for do, 12 steel drills, 2011 brass caps for service boxes, 599 service box keys, 188 three way brass cocks, 255 brass stop cocks, 338 brass nozzles, 11 dozen of water meter couplings and 4 dozen of water meter elbows, 6 Worthington water meter levers, 110 water meters repaired, besides a considerable number of fire hydrants, stop valves &c. repaired.

The total amount of water pumped by water power during the year, is 3,237,490,980 gallons, with an expenditure of \$7194.25 as shown in schedule No. 13 under the head of Wheel House, making \$0.01347 per million of gallons raised 1 foot high.

The total amount of water pumped by steam power at the wheel house during the same period is 614,052,372 gallons with an expenditure of \$13,605.73 making \$0.134 per million gallons raised 1 foot high.

The following table shows the cost of raising 1 million gallons 1 foot high by water and by steam for the last nine years, and the average cost by each method for that period :

YEAR	BY WATER	BY STEAM
1875	\$0.0200	\$0.119
1876	0.0140	0.144
1877	0.0158	0.080
1878	0.0106	0.170
1879	0.0093	0.119
1880	0.0120	0.123
1881	0.0136	0.121
1882	0.0118	0.258
1883	0.0135	0.134
Average of 9 years	0.0134	0.141

TAIL RACE.

Very few repairs were needed on the Tail Race. The keeper's house wants a little repair to the roof.

1202 lineal feet of board fencing where made on Mullins street on lots belonging to the City.

PIPE TRACK

All the pumping mains are in good order and do not require anything beyond the ordinary repairs. A good deal of filling with street scrapings has been made by the Road Department over the track of the mains on Atwater avenue, at the crossing of St. Antoine Street and if this is continued at the same rate as last year the grading of Atwater avenue at that point will soon be completed and the water mains will be beyond any danger of being interfered with by frost or any other cause.

A new wooden bridge on Atwater avenue at the crossing of the River St. Pierre, near the Wheel House, has been erected in place of the old one.

RESERVOIRS.

The reservoirs were maintained in good order and kept full during the whole year. The repairs done were as follows :

At the McTavish Reservoir the banks and slopes have been kept in good condition. The wooden fences on Carleton avenue, Pine avenue, and McTavish Street have been straightened and have received two coats of paint. The boards covering the retaining wall at foot of slopes have been coated twice with tar. The foot path on Pine avenue has been graded and a new plank foot path laid on McTavish Street. A pair of brass guides and brass chain for the float of the water gauge in the Valve House, were put in place of the old ones. It will be necessary to renew the floor of this building and replace the iron ladders of the well which are very rusty and dangerous. All the iron and wire railings will require a new coat of paint. The old flag pole requires to be renewed. A drain of about 100 feet long will be required at the corner of Pine Avenue and McTavish Street, to intercept some old drains which cause some leakage of obnoxious liquid through the upper slope of the bank at that corner.

About two dozen of shade trees on Carleton Avenue would

improve a good deal the appearance of this road which has become an important thoroughfare to the Mount Royal Park.

At the Peel Street Reservoir no repairs were done, but the iron railing will require a coat of paint and the overflowtile pipe for a distance of about 100 feet wants to be replaced by a cast iron one.

HIGH LEVEL SERVICE.

The pumping works for this service have been in constant operation during the year, and were maintained in good order.

The Engine and boiler have not needed any repairs. A new floor of flag stones has been laid in the boiler house the cornices of the dwelling and of the boiler house and the steam chimney have received one coat of paint and the roof of the boiler house one coat of coal tar.

Very little repair will be required during the year to the buildings and machinery.

Schedule No. 4 shows the work done by the Engine, that is 44,241,804 gallons, pumped into Peel Street Reservoir in 3,069½ hours. The total cost was \$2,757.23 or \$0.286 per million gallons raised 1 foot. Cost of raising 1 million gallons 1 foot high

in	1876	\$0.240
"	1877	0.253
"	1878	0.355
"	1879	0.283
"	1880	0.274
"	1881	0.226
"	1882	0.256
"	1883	0.286
Average of 8 years		0.271½

PIPE LAYING.

All the alterations to the distribution mains of the City contemplated by the last annual report were accomplished. The last being the extension of the water main from the Dorchester Street from Beaver Hill Station westward to near the City Limit by a 10 inch pipe extending from Beaver Hill to Monique and a 12 inch from Monique to York Street. There has also been laid a 12 inch pipe in Beauséjours Street from New Place to Chemin des Coudes Street and another 10 inch main was laid in Place Steuve from Dorchester to Commissioners Street, in place

lost and deposit, become too small to

pipes laid in the City during the
of 5,516 lineal feet of 12 inch, 2,832
2,818 of 4 inch. There have also been
10 inch, 15 of 6 inch and 10 of 4 inch,
pipes.

As to the total millage of water
by, a remeasurement on the plans and on
mains, fire hydrants, stop valves &c. was
up to date this measurement gives a total
feet of 30 inch cast iron water pipe, 32,918
do. of 16 inch, 38,278 do. of 12 inch, 74,-
do. of 8 inch, 191,966 do. of 6 inch, 340,678
do. of 3 inch, and 12,700 of smaller mains, mak-
lineal feet or 137.44 miles of main pipes. 10
do. of 24 inch, 4 do. of 16 inch, 55 do. of 12 inch,
do. of 8 inch, 245 do. of 6 inch, 586 do. of 4 inch
making a total of 1,056 stop valves. There are
including 52 private ones, and 26,975 houses
water.

These pipes, principally in the old City wards, have been
use, some of them over half a century. At the time
the City did not require large mains, as it now does, to
buildings against fire.

Buildings of those days have been replaced by large and
stores in which very valuable goods are stored, and for the
of which these old mains are quite inadequate. It is for
that several of them have already been replaced, and in
of this idea I would recommend that a 10 inch main be laid
r Street, (in place of the old 4 inch main) from St. Sacra-
Paul Street and connected to the main of that Street and of
Street. This will give a 10 inch main in St. Peter Street
llet to St. Paul.

er old main which is often breaking is the four inch of
et from Radegonde Street to St. Lawrence. It should be
is year by a 6 inch.

s way these old pipes will gradually disappear without the
ing felt too much by the City.

The construction of the new basins on the Lachine Canal at Guy Street, has caused a removal of a line of 10 inch main pipe which cross the Canal at that Street as an extra feeder to the water supply at Point St. Charles. This line of pipe was laid 7 or 8 years ago, according to the plans then proposed by the Dominion Government and with its sanction, but a change in these plans has since taken place and the pipes being in the way had to be removed and relaid some feet further down. The work is done as far as the Canal bank, and I wait the opportunity of the water being out of the Canal to make a connection with the old pipes under its bed.

MAINTENANCE OF DISTRIBUTION MAINS AND SERVICE PIPES, HYDRANTS AND PUBLIC FOUNTAINS.

As will be seen by the report of the foreman of the work shop Mr. Chs. Legacé, which report I have annexed, last year was an extraordinary one for the trouble experienced in maintaining the system of water distribution through the City, in good order, and the expenditure for that purpose was a good deal more than had been anticipated. The severity of last winter's weather seems to have been largely the cause of the trouble, as of most of the breaks in pipes took place during that season.

Most of the leaks which occurred in joints of pipes on Wellington, McCord, and on Dorchester Street, East of Beaver Hall are accounted for by the fact that the joints were originally badly made. In former times these pipes were laid by contract under great competition and their failure now tells their tale. For a year or two back, a system of observation has been followed and is still continuing, to ascertain whether the same joints when recaulked will leak again. If such should be the case it will be a question whether or not to uncover the pipes and relay them.

The suggestion offered under the head "Pipes Laying" in reference to the old mains, is strengthened by the report of the Foreman on the same subject, and the mains in some few streets, such as St. George, Cheneville, and Côté Streets, will have to be removed, if not this year at latest next. These mains are only 4 inch and were laid more than 30 years ago.

The report of Mr. Legacé gives full details of the administration under this head and all I can say is that the Department is doing its utmost to perfect its system.

SERVICE PIPE INSPECTION.

The service pipe inspection in houses has been maintained throughout the year and a great many places have been visited. These visits have resulted in showing the following water fixtures out of order Bib cocks 876, Urinals 36, water pipes burst 326, ball cocks 400, sound heard on pipes 234, stop cocks 18, closet cocks 54, closet valves 30, basin cocks 55, water closets 45, making a total of 2,074 water fixtures found leaking against 2,387 the previous year. These inspections bring to light the fact that an extravagant use of water in dwellings is becoming more and more common. This is due largely to the suggestions of sanitarians, some of whom advise people to leave their taps open and let the water run to rid their houses of the nuisance of bad smells emanating from defective house drains. I doubt if this use of the water effects the remedy desired.

It is hoped however that the City will, before long, recognize the advantage of passing a By Law to regulate the sewerage and plumbing in houses. This question has for a couple of years seriously occupied the attention of the water Department, which has a projected by-law on the subject based on the experience of the first plumbers of the City. With such a by-law in force I have no doubt much of the waste complained of would be arrested.

Another cause of waste is the practice resorted to by many, of letting the water run to prevent the pipes from freezing. This is apparently a cheap way to save fuel and plumbers bills. But in the long run, when the City has to spend another million and a half dollars to increase the capacity of the water works, in order to satisfy this extravagant waste, it will tell in the bill.

By experiments made a few days ago at the McTavish Reservoir, during the dead hours of the night from Sunday to Monday, a time it may be supposed no consumption of any importance takes place, it was found from repeated trials that the water was running from the Reservoir at the rate of over $7\frac{1}{2}$ million gallons per 24 hours it was known at the time that no leak of any importance existed in the water mains. Where then does that water go, unless through the open taps in houses? It should be remarked that at the time of the experiments the daily consumption was about 10 million gallons per day, only 25 per cent in excess of the waste at night.

WATER METERS.

The number of water meters as shown by schedule No. 8 is 598 of which 543 belong to the City and 55 to private parties. 172 are on hand at the work shop, many of these last are out of order. 57 are reported as entirely useless and have been ordered to the scrap heap.

The experience acquired in this branch has thought the Department, which meters are the best, and none others are now bought.

CONSUMPTION OF WATER.

The total amount of water pumped during the year is 3,851,543,352 gallons, making a daily average, as shown by schedule No. 7, of 10,552,174 that is an increase of 985,415 gallons over the daily average of 1882.

Of the above named quantity 41,060,042 gallons have been furnished to outside municipalities, 562,700 gallons used for flushing sewers and flooding rinks, 2,556,000 gallons for fires, 22,537,000 for watering streets and about 13,500,000 for public fountains. The amount used at the steps of the turbine wheels for lubricating purposes is 19,228,365 gallons.

The remarkable increase in consumption of water (nearly a million of gallons daily) is undoubtedly due to the causes mentioned under the heads "Service Pipe Inspection." Increase of population cannot account for it all, as that cannot have been proportionately greater than the previous year.

At this rate of increase in water consumption the time is not distant when the City will be called on to increase its water pumping power.

ADMINISTRATION.

The cost of administration has exceeded that of the previous year and the Department has been obliged to ask for a supplementary appropriation to meet the deficit. The amount appropriated at the beginning of the year was \$66,000 while the total expenditure has been \$69,598.85 leaving a deficit of \$3,598.85 which had to be covered by the supplementary appropriation. This was caused partly by the extraordinary repairs to the foundations of the bridge in front of the Wheel House, and to the steam pumping machinery, and partly to the unusual repairs to the distribution mains, necessitated through the severity

the last winter and the old age of the pipes causing several leaks to occur, thereby entailing a larger expenditure than was contemplated in the estimates at the beginning of the season.

For several years past the expenditure has been a little under the appropriations and in consequence these have been reduced each year in proportion to the excess of the previous year's appropriation over its expenditure, in the hopes that it could be still sufficient.

For instance in 1876 the appropriation was \$102,100, expenditure \$2,363.57, surplus \$19,736.43. In '77 appropriation \$76,00, expenditure \$66,597.78, surplus \$9,402.22. In '78 appropriation \$62,944, expenditure \$56,041.85, surplus \$6,902.15. In '79 appropriation \$5,460.08, expenditure \$52,459.84, surplus \$3,000.24. In '80 appropriation \$60,700, expenditure \$60,534.83, surplus \$165.17. In '81 appropriation \$62,697.92, expenditure \$65,722.82 here there was a deficit (the first in 6 years) of \$3,024.90. In '82 the appropriation was \$0,872, expenditure \$68,530.59, surplus \$2,341.41. In '83 that is the year, the appropriation was \$66,000 but the expenditure exceeded above stated.

The limit of cutting down the appropriations has in my opinion been reached and larger expenditure will be necessary in order to meet the increasing wants of our growing City.

It was also with the view of keeping the expenditure down to a minimum that for some years past many repairs, not then very pressing, were neglected, but the hour has come when it will not be very prudent to neglect them any longer.

The fact of the annexation of a new ward to the City will also tend to augment the expenses of administration.

The whole respectfully submitted.

LOUIS LESAGE,
Supt. of M. W. W.

Montreal, February 23rd. 1884.

PUMPING WORKS, January 15th 1884.

LOUIS LESAGE, Esq.,

Supt. Water Works.

DEAR SIR,

I beg to submit my annual report for the year ending 31st. December 1883.

Laying before you a statement of the work done together with that which I deem necessary for the proper maintainance of the works. The principal portion of the work recommended in my last year report was carried out, that portion which was not, will require to be done during the ensuing year.

No. 1 WHEEL HOUSE.

This building got two coats of paint and had a new floor of white pine laid, also some patching done to the ceiling, and the large door on the north end. There is a frequent caving in of the bank on the west side, which occurs generally after heavy showers of rain, indicating that it is caused in whole or part by the surface water making its way down by the foundation wall ; this will require to be remedied, and the roof painted.

Nos. 2, 3 AND 4 WHEEL HOUSE.

This building underwent no repair. It is very much in need of painting and double windows ; with these exceptions it is in very good order.

WORK SHOP.

This building had no repairs done to it, and will not require any except the painting of the roof. The shafting was furnished with a mortice wheel and pinion. A complete set of spiral drills, and an independent jaw chuck was added to the shop tools, also a new set of leather belts. A new grinding stone will be necessary, the present one being worn-out.

THE BRASS FOUNDRY.

This building and plant are in first class order. The only repairs done were the putting up of a new core bench, and whitewashing the walls.

THE GROUNDS.

The slope of the Wheel House bank immediately in front of the dwellings was damaged by a spring slide; this I dressed and sodded over anew, and laid out the square in front of the dwellings in grass and flower plots, which presents a very nice appearance and has been the subject of favorable and complimentary remarks by those visiting the works.

About twenty-five (25) of the shade trees planted last year did not take, these I would like to replace next arbor day; with this exception I think the grounds will only require the ordinary attention next summer. A new and substantial wooden bridge has been built on Atwater Avenue, spanning the St. Pierre River in the immediate vicinity of the works. The mason work of the waste-weir bridge on the east side of the work shop, being considerably frost sprung and undermined by water, was taken down and rebuilt. The coping stone and two or three courses of the stone work of the road and arch retaining wall should be rebuilt in like manner during the summer.

THE FROST TRAPPING.

The system of frost trapping that has been in use for some twelve years is a most erroneous one, from the fact that it diminishes the speed of the three Turbine wheels from one to one and a half revolution per minute, or a loss of 734,420 gallons per twenty-four hours.

I am prepared to introduce a new system that will obviate this loss, the simplicity of which will be apparent when I state that its cost will not exceed one hundred dollars.

Nos. 1 AND 2 ENGINE HOUSE.

The repairs done to this building consist of renewing the platform in the basement around the under works of the Engine. The building is now in good order and will not require any repairs during the year.

No. 3 ENGINE HOUSE.

No repairs were done to this building. As it was not painted since it was built eight years ago, it is sadly in need of it.

THE BOILER HOUSE.

No repairs were done to this building worthy of mention.

THE COAL SHED.

The Coal Shed received two (2) coats of paint, which is the only repairs done to it. There is an unmistakable sign of the action of the frost on the foundation at the east corner which will require some repairs during the year.

THE DWELLINGS.

The only repairs done to these buildings were the renewing of the sky light windows and frames ; some trifling repairs were done to the brick work of one of the sheds in rear.

There is neither a dining or bath room in my house, and I would be very grateful indeed if you would supply these necessary wants, which could be done by a slight alteration and at a trifling cost.

No. 1 TURBINE.

The high pressure Engine connected to these pumps was removed and laid in a temporary shed on the west side of the Coal Shed, considerable repairs were done to this machine consequent upon the removing of this Engine. That portion of the foundation which had to be cut away to make room for the cylinders had to be rebuilt. The foundation stay-bolts that were removed for the same purpose were replaced in position ; two wrought iron girders were stretched across the space occupied by the gearing of this Engine, and a platform of cast iron grating covering the whole space, a new iron stairs leading to said platform was also added. The whole machine, including the flume and pipes inside the building, were painted. The whole is now in good order.

No. 2 WHEEL.

The upright arms of this wheel were furnished with new gibs and keys, and some minor repairs done to the diagonal arms. In the pump tanks were placed screens for trapping the foreign matter from getting into the pumps, this proved of great service, to which, I believe in a great measure is due the splendid run made by these wheels.

The fork pin in the south pump worked loose, and was repaired by means of tight fitting keys. The thread stripped on the plunger rod of the same pump, it was recut and furnished with two suitable brass nuts.

No. 3 WHEEL.

As anticipated, the large bevelled wheel on the counter shaft of this wheel stripped its cogs on the 5th Nov. The damaged wheel was removed and duplicated, all the gearing shafts and connections painted and ready to start on the 14th of the same month. One of the pumps worked loose, from the anchor bolts causing the joint connecting the said pump with the air vessel to work loosely ; the pump was properly secured, the joint remade, and is at present in good order, a foot valve guide pin in the centre pump gave some trouble, this was repaired in such a manner as will obviate all trouble from that source in the future. The speed of this wheel and No. 4 is very much retarded from floating wood blocking them up. I would recommend that a copper wire grating be properly fixed to the head race entrance, which would effectually remove this source of loss and trouble.

No. 4 WHEEL.

On two occasions it became necessary to remove the back and front covers of the north pump owing to the valve being held up by pieces of wood becoming jammed under them, which found their way in through a rent that was afterwards discovered in the inlet grating, the cause of which rent is manifestly due to the insufficient area of said grating. Believing this to be the case, I had the casing of said grating, which consist of wood, perforated, in order to increase the area, and experienced no trouble since. As the present grating is permanently damaged, I would recommend that a duplicate be on hand in case of the present one giving out.

THE BEAM ENGINES.

In consequence of the severity of the winter there was a likelihood of these Engines being brought into service, and as they were not used since Sept. 1877 I brought under your notice the necessity of having them overhauled, in order that they would be ready for service if required.

The following is the condition in which they were found and the work done to them.

All the internal parts, with the exception of the pistons and steam valves, were found very much corroded and solid with rust. The motion had to be pried apart with bars, the gibs and keys were seized in their

places and driven back with difficulty; no packing was found in the engine air pumps or water pumps; the engine relief valve could not be moved with all the power of the screw attached to them so completely were they solidified with rust.

Repairs to No. 1 Engine. The air pump bucket valve was found sprung about $\frac{1}{2}$ an inch, which was straightened and readjusted; the discharge valve of the same was found with the face completely gone, which was renewed; the thread was stripped on the holding down bolts of the main pillow block, and the nuts seized to such an extent that five men could not stir them with all the appliances we have, they had to be split with the hammer and chisel and replaced with new ones.

No. 2 Engine. The foot valve was found split, and was renewed. The main steam pipe was found broken at the flange connecting it with the upright pipe on the boilers, the broken portion was removed and replaced with a faucet expansion joint, the engine feed pump was taken apart, the valves readjusted and put in working order, the injection valve, also, which was found seized. All the motion journals and other parts were overhauled. The engines started and work in their usual style, and in order to keep them in working order they get occasional runs from time to time.

No. 3 ENGINE.

I stated in my last year's report that this engine was not likely to require more than the ordinary attention during the ensuing year. Not anticipating the enormous amount of work that was before it, owing to the severity of the winter, this engine pumped from January 1st to April 12th 561,914,184 gallons. This heavy duty changed the aspect of affairs and made repairs to the piston absolutely necessary. The low pressure pistons were overhauled, replaced and put in first class order. The steam chest and cover joints were re-made and some slight repairs done to the balance valves suspension links, and 22 broken pump valve springs replaced. It will be necessary during the ensuing year to reface the steam valve faces and seats, and set up the high pressure piston rings; after which the Engine will be in good order.

THE BOILERS.

The tubular boilers were not used since they were inspected last year, and are consequently in the same order as left after inspection.

Nos. 1 AND 2 BATTERY OF CORNISH BOILERS.

The steam drums of these boilers were covered with asbestos, with a view of preventing radiation. The covering is put on in such a manner that it can be removed in sections without damage, in case of fires to the boilers. Four of the joints on the main line of the steam were renewed and some trifling repairs done to the brass mountings. The whole is at present in good order.

In conclusion I have much pleasure in stating that the year's run has been most satisfactory, in fact unprecedented in the history of the works, I am proud to acknowledge that it is due in a great measure to the valuable suggestions made by you from time to time.

The whole respectfully submitted.

I have the honor to be, Sir,

Your most humble servant,

DANIEL KEARNEY,

Engr Pumping Works.

WATER WORKS SHOP, JANUARY 1884.

TO L. LESAGE, ESQ.,

Supt. Montreal Water Works

SIR,

The following is a report of repairs done to mains, hydrants and valves during year 1883 also repairs to distribution pipes which for the year just ended, have been more numerous, than the 6 or 7 years previous, as the following statement will show. A great number of the leaks, on main water pipes occurring last winter gave considerable trouble in tracing where the leak existed, for instance at the corner of Craig and St. Gabriel Streets, where the pipe was found to be very thin on one side and corroded through, and which took the labor of 4 men for 3 days each, also a valveman, to find and repair leak, at the corner of Cote and Craig Streets, the 3in. main pipe was cracked all around, and it took a pipe-layer and the labor of 3 men for 4 days to find out and to repair it. Grey Nun near Common St. took a pipe-layer and 4 laborers 2 days each to find and repair leak. The 4in. main being split about 24 inches long. Hutton's Avenue off Sherbrooke Street the 4in. main pipe was found broken all around, and it took a pipe-layer and 3 laborers 2 days each to trace leak and repair it. This pipe was found too large for purpose required, and it was taken up and replaced by a 5in. lead pipe. On Notre Dame Street West, 8 laborers were for 4 days each, also a pipe-layer the same time, to dig and repair a leak on 10in. main water pipe, which was split from end to end, and a piece blown out of the bottom of pipe, which measured 10 inches long and about 5 inches wide, and the pipe was found to be very thin on one side. On St. Martin St. 3 laborers and a pipe-layer were for 5 days each digging an excavation about 100 feet long (where the macadam was very thick, and of course hard frozen) to find a leak on main pipe, and the appearance of the leak proved to be about 100 feet from where leak really was, and then main pipe was found to be broken across. On Common west of King St. there was a pipe-layer and 4 laborers for 6 days each searching for a leak on main pipe, which was most difficult to trace, as the gushing sound of the water escaping was heard a good distance away from where leak was found, and which proved to be a split in pipe about 4 feet long, also a piece about 12 inches long blown out of bottom. On Mayor Street, corner of Bleury, there was a pipe-layer and 5 men

for 4 days each, looking for a leak, which was on account of the 4in. main pipe feeding Mayor St. breaking at each edge of the excavation which was made for drain. I only mention here the leaks which caused most trouble to trace, as the time taken made it very expensive to repair them. But I could mention a great many more cases of serious leaks such as the leak on 30in. main pipe on Sherbrooke corner Shuter Streets, which took a pipe-layer and 13 men 4 days each to trace and repair, also a serious leak on St. Denis near Ontario Street on the 10in. main, and another on Bonsecours St. corner St. Louis Street, where 10in. main pipe was badly broken. There were during the year 22 joints blown out on 12in. main on Wellington Street, between St. Etienne St. and the Grand Trunk Crossing. I need not mention the cause of those leaks, as that was fully explained in my report for year 1882.

During the year 10 joints were blown out on the 12in. main on McCord Street, and on Dorchester Street 10in. main from Beaver Hall Eastwards, there were 12 joints re-caulked, those joints all leaked principally on account of there not having lead enough in them when first laid. Altogether during year we repaired 1 break on the 30in. main, 4 on the 10in. main, 1 on the 8in. main, 9 breaks on the 6in. main, 23 breaks on the 4in. main, making a total of 38 broken main pipes and the number of joints re-caulked were as follows on the 12in. main 32, on 10in. main 16, on 6in. main 20 and 17 on 4in. main, and to the valves we put 1 16in. spindle, 7 6in. spindles and 4 4in. spindles, also renewed 3 10in. street valves, one 6in. ditto and 9 4in. ditto. The two valves, one 6in. and 1 8in. on the corner of Craig and Bonsecours St. need to be renewed, also the main pipe on Cote St. is very bad, also that on Chenneville from Lagauchetiere to Craig St. and on St George below Vitre Street, those pipes are laid since a very long time, and I would recommend that there be a 6in. main pipe laid in their stead.

The repairs to hydrants, were as follows, 59 hydrant valves were renewed, not that they were worn out, but were injured principally by small gravel, which is introduced by children through the grating of street watering nozel, and this gravel becomes imbedded in leather valve, thereby causing hydrant to leak and also the frequent use in summer months of some of them for street watering tends to wear these valves very fast. There was 18 old kind hydrants, replaced by patent non-f
once n
when
ts, 5 hydrants were renewed. I am happy to state
withstanding the severity of our winter, the hydrants
found in perfect order.

The number of hydrant Inspectors, was formerly 12 but since the annexion of Hochelaga ward there is one Inspector extra, which makes the number 13 in winter and 5 in summer, instead of 12 in winter and 4 in summer as formerly. During the year there was 232 hydrants reported frozen 1857 times, and on account of the severity of the winter the Inspectors for precautions sake reported them when there was the least appearance of frost, interfering with the proper working of hydrants but in most cases they were always fit for use in case of fire. There is yet in the City 4 half-moon hydrants and 2 old American hydrants, which should be replaced, as they are not safe to use. We placed in position during the year 24 non freezing hydrants, 4 hydrants with chambers, the last ones were placed where I was sure there is no danger to freeze. There is now in the City 124 non-freezing hydrants, which when properly put in give perfect satisfaction, and I would be very glad to see them all through the City instead of the other kind.

The leaks on service pipes were as follows, 24 service pipes were found broken over drains, 336 were found split or broken across, from various causes which in many cases could not be ascertained, but I believe that the extra pressure from the 24in. main on Colborne Avenue, was partly the cause of so many leaks and the severity of the weather last winter was partly the cause of many others. We renewed 71 stop cocks, also put in 656 iron boxes instead of wooden ones. These boxes are the best that can be put in for want of something better, but in all cases the iron boxes as well as the wooden boxes are a failure, in our cold climate, but I am happy to hear that you are trying to remedy the defect of both kinds. There was 83 couplings leaking, 57 service pipes broke in foundation wall, 50 service pipes choked, 30 services were attended to for various reasons, 124 service pipes found frozen inside of houses, 352 service pipes found frozen in wall and 41 pipes frozen in the street, in most cases the pipes frozen in foundation is from the neglect of occupants neglecting to protect them from frost.

The St. Louis Square fountain will require a new grate, also a 9in. elbow for waste weir. Place d'Armes 4in. valve to fountain, requires a new spindle. On Court House Square fountain, the pipe through centre of fountain is burst, and the fountain will require to be taken down to repair it. At Victoria Square south side, the waste water and over flow pipes from basin are choked, also the 1½ in. pipe to main jet is burst and will require renewing. the fountains and drinking taps throughout the City will require the usual repairs next spring.

In concluding this my annual report I tender to you my most sincere thanks, for your valuable advice, which was of great advantage to me, and the men under my charge have faithfully fulfilled the duties entrusted to them.

Respectfully submitted,

CHS. LAGACE,

Foreman.

WATER WORKS SHOP, JANUARY 1884.

ESAGE, ESQ.,

Supt Montreal Water Works.

following alterations I have omitted in my annual report :
 lead pipe on St. Denis Street, opposite Viger Square, and between
 and Dubord Streets, should be renewed as it is completely
 and several times during year 1883, we had to repair it, and
 it burst the water got into cellars of houses, as the pipe runs
 through all the way, and I would also suggest that Berthelet St.
 be connected to Bleury St. 8in. main to increase the pressure
 hydrant put in Berthelet St. last summer. Also I would recom-
 mend the 4in. main pipe on Balmoral St. be connected to the 6in.
 Ontario, which would take about 250 ft. of 4in. pipe. This
 is particularly necessary to increase pressure to hydrant on
 St. also Workman St. main pipe should be connected to
 St. for similar reasons. In Leroux Lane, which is between
 and St. Martin Sts. and runs parallel to Seigneurs St. the
 pipes, also service pipes, need renewing. At present there is laid
 rubber coated pipe for main, and the service pipes are of the
 material, the pipes are all corroded, especially at the joints.
 times these last few years, they burst, giving considerable
 to repair them, causing more or less damage to adjoining

Respectfully submitted,

Your obedient servant.

CHS. LAGACE,

Foreman.

No. 1—SCHEDULE SHOWING THE DUTY OF TURBINE No. 1.

MONTHS	Time of Pumping.	Revolutions.	Gallons pumped.	Castor Oil.	Tallow.	Coal Oil.	Seal Oil.	Valve-line.	Cotton Waste.	Coal for Heating.
	Hrs. M.									
IN POUNDS.										
1883										
January.....	743.15	662,186	140,309,338	92.00	30.00	164.75	15.00	.....	26.31	108480
February.....	645.19	527,136	122,822,688	67.50	.....	114.75	.....	.....	27.00	90590
March.....	840.15	241,756	56,329,148	24.75	20.00	91.31	.....	30.00	14.00	96810
April.....	570.30	466,164	108,719,412	81.00	17.00	102.00	27.00	.....	26.00	60570
May.....	730.00	770,366	132,585,278	57.75	70.00	116.87	27.00	.....	22.56	26,70
June.....	703.05	675,327	139,391,191	101.25	.....	134.50	.....	.....	24.43	.....
July.....	742.45	550,276	128,814,108	156.87	60.00	102.00	15.00	.....	26.43	.....
August.....	744.00	576,433	134,308,889	130.50	54.00	127.50	47.00	.....	27.37	.....
September.....	720.00	564,898	131,680,768	135.00	40.00	138.12	.....	.....	30.00	.....
October.....	703.30	563,669	131,334,877	123.75	36.00	165.75	20.00	.....	26.50	26770
November.....	707.00	566,749	132,652,517	118.00	36.00	189.37	50.00	.....	22.00	46540
December.....	736.40	74,724	135,911,168	101.25	25.00	165.75	40.00	.....	23.75	61080
Total.....	8085.10	6,360,064	1,481,899,721	1,399.62	372.00	1,672.67	281.00	30.00	296.35	518,60
Last Year.....	8376.55	6,584,121	1,634,100,193	1,079.75	167.50	1,821.11	.....	65.00	306.93	442460

showing the duty of the Breast Wheel and of Turbines Nos. 2 and 3.

MONTHS.	Time of pumping.				Revolutions.				Gallons pumped.	Castor Oil.	Tallow.	Coal Oil.	Cotton Waste.
	Breast Wheel.	Turbine		Breast Wheel.	Turbine								
		No. 2.	No. 3.		No. 2.	No. 3.							
1833	Hrs. M.	Hrs. M.	Hrs. M.										
January.	55 00	1 10	724.00	38,569	944	946,206	87,221,640	85.50	.....	.....	175 87	24 00
February....	15.00	.....	196.20	12,042	.....	186,232	17,798,168	13 50	.....	.....	108.37	20.00
Mar. h. ....	.....	.....	403.45	.....	.....	505,731	43,492,866	36.00	.....	.....	95.62	24.81
April	351 10	277.55	577.45	292,892	176,236	672,863	127,297,162	76.50	.....	.....	112.62	29.00
May	744 00	107.30	739.00	551,198	62,380	868,922	165,533,836	85.25	.....	.....	116.87	29.50
June	552 05	454 10	696.45	407,792	295,964	791,306	172,298,204	110.25	.....	.....	110.50	35.50
July.	726.45	698 50	742.45	525,551	384,750	774,463	201,328,366	177.75	.....	.....	106.25	37.50
August	742.30	736.40	744.00	551,766	481,505	727,707	216,098,910	175.50	.....	.....	129.62	33.00
September...	720.00	615.30	720.00	550,881	333,122	712,769	199,530,578	144.00	.....	.....	142.37	38.00
October	732.45	677.45	739.50	564,924	403,602	676,359	201,508,722	137.25	..	.....	165.75	33.00
November...	708.45	153.55	709.30	546,340	93,563	854,645	168,196,514	117.00	.....	.....	176.37	30.00
December...	729.35	6 40	736.40	546,597	4,244	858,709	155,373,442	92.25	.....	.....	167.87	28.50
Total ..	6,077.35	3,700 5	7,730.20	1,589,552	2,289,310	3,575,812	1,755,591,408	1,250.75	.....	.....	1,608.08	362.81
Last Year...	5,967.40	3,028.15	8,166.40	4,506,910	1,999,885	9,324,692	1,764,929,172	1,407 25	196.62	1,848 72	372.59		

IN POUNDS.

No. 3.—SCHEDULE showing the Duty of Engine No. 3.

MONTHS.	Pump- ing Time.	Revolu- tions.	Gallons pumped.	Coal used, pounds.			Average pressure on pump pistons	IN POUNDS.					
				For pumping	Bank- ing Fires.	To raise 1,000,000 gallons.		Castor Oil.	Coal Oil.	Seal Oil.	Valvo- line.	Cotton Waste.	
1883.													
January.	3:29.20	230,958	100,305,288	481,160	52,350	5,319	78	18.00	64.00	32.81	200.00	22.60	
February.	5:57.25	367,384	160,266,624	777,760	13,770	4,938	75	42.75	138.12	30.62	392.00	30.10	
March.	7:42.30	519,817	229,673,292	1,119,010	2,330	5,079	75	71.00	270.25	54.68	488.00	55.50	
April.	2:50.00	171,305	74,688,980	363,860	1,769	4,895	74	20.25	96.00	28.45	168.00	18.10	
May.													
June.	5:44.35	35,313	15,397,340	80,360	12,490	6,430	74	6.75	16.00		56.00	8.00	
July.	7:10.05	47,552	20,732,672	100,840	17,790	5,722	76	13.50	34.25		104.00	9.00	
August.	9:25	5,029	2,192,614	12,600	11,070	10,795		2.25					
September.													
October.	46:30	25,943	11,311,148	66,190	1,2430	6,951	74	9.0	26.12	10.93	72.00	18.00	
November.	9:26	5,744	2,504,384	13,250	2,160	6,153	75	2.25	24.00	13.12	8.00	6.62	
December.					1,010				36.25	10.93	8.00	12.00	
Total.	2,110.20	1,408,377	614,052,372	3,041,830	127,160	5,166		196.00	704.99	181.62	1512.00	183.12	

MONTHS.	Pumping Time.		Revolutions.	Gallons pumped.	Coal used, pounds.				Average Pressure on Pump Pistons.	In pounds.			Castor Oil.	Valvoline.	Cotton Waste.
	H.	M.			For Pumping.	For Banking Fires.	To raise 1,000,000 Gallons.	2.00		21.00	3.00				
1883															
January	282	00	346,583	4,158,996	43,650	7,104	12,203	100	2.00	21.00	3.00				
February	270	40	333,659	4,003,908	42,148	6,330	12,108	100	2.00	24.00	3.00				
March	310	05	242,224	2,906,688	31,243	6,213	12,886	100	2.00	24.00	3.00				
April	192	40	223,237	2,678,844	27,583	5,804	12,463	100	2.43	16.00	5.00				
May	238	50	300,599	3,607,183	36,350	6,109	11,793	100	2.00	14.00	4.00				
June	259	10	319,631	3,835,572	37,907	6,577	11,598	100	2.00	27.00	5.00				
July	280	30	344,690	4,136,280	44,707	7,030	12,508	100	2.50	23.00	3.00				
August	268	50	359,923	4,319,076	41,083	6,767	11,079	100	2.00	23.00	2.00				
September	240	45	312,513	3,750,156	36,878	6,279	11,508	100	3.00	12.00	3.00				
October	265	45	336,480	4,037,760	39,380	6,716	11,411	100	3.50	15.00	4.00				
November	224	15	280,962	3,371,544	31,794	5,458	11,019	100	1.50	21.00	4.00				
December	236	00	286,316	3,435,792	35,356	6,016	12,041	100	1.50	15.00	....			
Total....	3069	30	3,686,817	44,241,804	448,059	76,483	11,856		26.43	235.00	39.00				

No. 5.—SCHEDULE showing the depth of Water, the rain fall and the average temperature at 9 a. m. at McTavish Street Reservoir.

MONTHS.	Average monthly Depth in feet.	Rain Gauges, in inches.				Average temperature at 9 a. m.
		Rain.	Snow.	Snow reduced to Rain.	Total Rain.	
1883						
January	22.13	0.32	20.25	1.80	2.12	1 - 1
February	21.94	0.32	15.50	2.71	3.03	1 - 2
March	22.58	....	38.50	3.60	3.60	1 - 2
April	22.78	0.08	4.00	0.48	0.56	3 - 6
May	22.75	5.88	.....	.....	5.88	4 - 4
June	22.30	3.21	.....	.....	3.21	6 - 7
July	22.62	4.01	.....	.....	4.01	6 - 5
August	22.71	1.49	.....	.....	1.49	6 - 5
September	22.66	3.53	.....	.....	3.53	5 - 0
October	22.33	2.09	.....	.....	2.09	4 - 5
November	22.73	1.39	11.75	0.93	2.32	3 - 8
December	22.74	0.46	22.00	1.98	2.44	1 - 0
Total .....	.....	22.78	12.00	11.50	34.28	3 - 4
Last Year .....	.....	20.52	100.62	8.37	28.89	

No. 6.—Repairs to Mains, Hydrants and Valves during 1883.

SIZE.	30"	16"	12"	10"	8"	6"	4"	Hydrant valves renewed.	Old kind Hydrants replaced by patent ones.	Defective hydrants renewed.	Hydrant Rods broken.
Main pipes broken.....	1	0	0	1	1	9	23				
Valves renewed.....	0	0	0	3	0	1	9				
Valve spindles renewed....	0	1	0	0	0	7	4				
Joints blown out.....	0	0	32	16	0	20	17				
	1	1	32	23	1	37	53	59	18	5	14

REPAIRS &C. TO SERVICE PIPES during 1883.

Services broken over drains.	Services broken various causes	Couplings leaking.	Cocks renewed.	Burst in wall.	Pipes choked	Service pipes frozen outside.
24	386	83	71	57	50	41
Other causes.	Service pipes frozen inside houses	Frozen in wall	Bows replaced by 3 way cocks.	Wooden service boxes replaced by iron boxes.	Number of places where water works plumbers were called during the winter 1882-1883.	
30	124	352	31	656	597	

New patent hydrants put in during year 1883..... 24

New hydrants put in during year 1883 (with brick chambers,) 4

Number of patent hydrants in position up to year 1884..... 148

Total of hydrants frozen during winter commencing December
1882 ending April 1883.

Dec.	Jan.	Feb.	March.	
3	558	535	671	Total 232 hydrants 1857 times

No. 7 — COMPARATIVE TABLE showing the average Daily Consumption for each month and for each year, from 1874 to 1883, in the City of Montreal.

	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.
January.....	7,095,986	8,384,520	8,852,518	8,753,185	8,483,438	8,711,520	8,675,067	9,548,641	8,239,612	10,575,363
February.....	7,869,775	8,722,379	9,389,035	9,492,078	8,748,908	8,825,552	8,892,987	9,126,557	8,669,932	10,745,981
March.....	7,744,778	8,648,153	10,538,483	8,540,736	8,823,315	9,082,027	9,430,162	9,009,366	9,024,616	10,631,461
April.....	8,410,697	8,677,375	9,544,695	8,450,236	8,679,603	9,198,983	9,098,94	9,147,791	9,074,754	10,356,518
May.....	7,523,392	8,843,682	8,686,748	8,818,552	8,253,495	9,279,565	9,132,068	9,058,872	8,915,219	9,626,842
June.....	7,449,288	9,342,653	9,734,198	9,706,804	9,773,318	9,487,630	10,238,352	9,674,104	9,386,071	10,566,558
July.....	9,039,422	9,361,989	10,527,439	10,074,892	10,337,277	10,025,080	10,574,083	10,423,208	10,305,116	11,239,205
August.....	9,452,456	8,391,986	10,988,611	10,039,691	9,910,444	10,312,233	11,097,648	10,548,459	10,811,241	11,374,208
September.....	8,395,643	9,065,770	10,026,061	9,615,654	9,112,664	9,753,752	10,720,280	10,981,133	10,747,854	11,038,378
October.....	8,561,262	8,614,656	10,141,385	8,234,079	9,663,996	9,034,211	10,131,764	10,285,658	10,015,944	11,101,766
November.....	7,974,388	8,821,966	9,995,29	7,844,593	9,116,044	8,270,213	9,230,560	9,093,571	9,796,205	10,091,780
December.....	8,395,810	8,547,777	8,770,611	8,183,582	8,191,048	8,169,285	9,046,544	8,350,180	9,727,230	9,331,761
Daily average for each year.	8,209,408	8,785,217	9,766,261	8,979,512	9,091,131	9,177,504	9,691,901	9,606,295	9,566,759	10,552,174
Incr. } over } Decr. } from }	809,602	575,809	981,044	.....	111,619	86,373	514,397	.....	.....	985,415
	.....	.....	.....	786,749	.....	.....	.....	85,606	39,536	.....

8.—SCHEDULE showing the different kinds and sizes of Water Meters used.

NDS.	Sizes in Inches	Property of the City.				Private Property.				Grand Total.
		In the City.	Outside the City.	At the Work Shop.	Total.	In the City.	Outside the City.	At the Work Shop.	Total.	
.....	10	.....	1	.....	1	.....	.....	.....	.....	1
.....	6	3	2	1	6	.....	.....	.....	.....	6
.....	4	11	3	3	17	.....	.....	.....	.....	17
.....	3	15	2	2	17	5	.....	.....	5	22
.....	2	25	1	8	34	8	.....	.....	8	42
.....	1½	7	.....	2	9	4	.....	.....	4	13
.....	1	3	.....	3	6	2	.....	.....	2	8
.....	¾	11	.....	.....	11	3	.....	1	4	15
.....	¾	11	.....	63	74	1	.....	2	3	77
.....	¾	1	.....	1	2	1	.....	.....	1	3
.....	1	24	.....	5	29	1	.....	.....	1	30
.....	¾	79	.....	41	120	4	.....	1	5	125
Union.....	4	.....	.....	2	2	.....	.....	.....	.....	2
.....	3	1	.....	.....	1	.....	.....	1	1	2
.....	2	.....	.....	2	2	.....	.....	.....	.....	2
.....	1½	2	.....	3	5	.....	.....	.....	.....	5
.....	1	3	.....	.....	3	.....	.....	.....	.....	3
.....	¾	7	.....	7	14	.....	.....	.....	.....	14
.....	¾	2	.....	.....	2	.....	.....	.....	.....	2
.....	4	.....	.....	1	1	.....	.....	.....	.....	1
.....	3	2	.....	.....	2	.....	.....	.....	.....	2
.....	2	5	.....	.....	5	.....	.....	.....	.....	5
.....	1½	3	.....	1	4	.....	.....	.....	.....	4
.....	1	22	1	3	26	.....	.....	.....	.....	26
.....	¾	27	1	1	29	.....	.....	.....	.....	29
.....	¾	17	.....	2	13	.....	.....	.....	.....	13
ington.....	3	2	.....	.....	2	.....	1	.....	1	3
.....	2	3	1	1	5	6	.....	.....	6	11
.....	1½	5	.....	.....	5	1	.....	.....	1	6
.....	1	27	2	1	30	.....	.....	.....	.....	30
.....	¾	53	.....	3	56	9	.....	3	12	68
ental.....	¾	3	.....	3	6	.....	.....	.....	.....	6
.....	2	.....	.....	1	1	.....	.....	.....	.....	1
.....	1	.....	.....	1	1	.....	.....	.....	.....	1
.....	½	.....	.....	1	1	.....	.....	.....	.....	1
.....	1	.....	.....	.....	.....	.....	.....	1	1	1
.....	½	.....	.....	1	1	.....	.....	.....	.....	1
totals .....	.....	368	12	163	543	45	1	9	74	598

No 9.—SCHEDULE showing the Pipes, Hydrants, Valves, Services, &c., laid in the City of Montreal, in 1883.

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.				Number of Valves.				Hydrants.	Houses supplied.	Length of Lead Pipe in feet.	Stop Cocks.	
	12 in	10 in	6 in.	4 in.	12 in	10 in	6 in.	4 in.					
	Total.	Total.	Total.	Total.	Total.	Total.	Total.	Total.					
<i>East Ward.</i>													
Commissioners											3	86	3
St Paul	27	18											2
Champ-de-Mars		25							1	2	97		
Jacques-Cartier Square	457	72					2	3	5				
Victor	198						1		1				
Perthuis												20	1
Bonsecours	297						2		2			10	1
Notre Dame										1		47	1
Total	522	475	97	1094			3	2	3	8	10	260	8
<i>Centre Ward.</i>													
St James											1	16	1
Commissioners											2	42	2
Notre-Dame											2	26	2

SCHEDULE showing the Pipes, &c., laid down. — *Continued*

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.				Total.	Number of Valves.				Hydants.	Houses supplied.	Length of Lead Pipe in feet.	Brass Stop Cocks.
	12 in		10 in			6 in.	4 in.	Total.					
	12 in	10 in	6 in	4 in									
<i>St. Antoine Ward.</i>													
Seigneurs				36	36					2	64	6	2
Loganachetiere										9	309	3	2
St Antoine										5	162	5	4
Lincoln Avenue.....										7	170	5	4
Shuter										7	160	4	4
Notre-Dame West.....				320	320				1	12	466	10	1
St Catherine.....										1	59	1	1
Queen.....				68	68					3	132	3	3
Drummond				36	90				1	2			
Jurors			54										
Mansfield											51	1	1
Metcalfe										2	86	2	2
Mountain.....										8	189	5	5
Fort										2	72	2	2
Windsor										2	34	1	1
Ontario Av										3	188	3	3
Durocher										4	111	2	2
Ste Marguerite.....										1	25	1	1
Scotland				27	27								
Chomedy										2	37	1	1
Towers.....				392	392					4	86	2	2
St James West.....				496	496				2	1	53	1	1
Craig				28	28				1				
Tupper										4	121	4	4

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St. Denis	15	15	1	1	1	20
Rivard	229	229	1	1	1	20
Campeau	12	12	1	1	1	20
Total	1500	114	1614	4	90	2638
<i>St. Mary's Ward.</i>						
Ontario.....						
Fullum						3 50
Papineau Road						4 50
Plessis	168	198				1 59
Lagauchetière						5 109
Notre-Dame East.....	24	24				4 45
St Alphonse	9	9				2 91
Voligeurs						1
Colborne Avenue	198	198				1 20
St Pierre Lane.....						3 54
Craig						3 39
St. Catherine	16	16				2 42
Dufresne.....						7 244
Robb Terrace.....	1557	18	1575			5 77
Panet.....			2 3			5 78
Dorchester						2 47
Fullum Lane.....	222	222				10 189
DeMaisonneuve						2 49
Thibault	185	185				5 108
Parthenais						1 25
Barclay						12 289
Champlain						8 178
Iberville	454	454				26 790
Mignonne.....			1			1 2633
Total	1581	837	463	2881	4	111

SCHEDULE showing the Pipes, &c., laid down.—Continued.

RECAPITULATION.

NAMES OF WARDS.	Length in feet of Cast Iron Pipes.					Number of Valves.					Hydrants.	Houses supplied.	Length of Lead Pipe in feet.	Brass Stop Cocks
	Length in feet of Cast Iron Pipes.					Number of Valves.								
	12 in	10 in	6 in.	4 in.	Total.	12 in	10 in	6 in.	4 in.	Total.				
East.....	522	475	97	1094	.....	3	2	3	8	....	10	260	8
Centre.....	5	84	5
West.....	9	189	7
St. Ann.....	987	341	1328	1	....	3	1	5	6	52	1358	39
St. Antoine.....	5516	729	483	1738	8466	4	2	3	5	14	7	130	4444	97
St. Lawrence.....	9	56	65	.....	.....	.....	1	1	3	17	407	10
St. Louis.....	349	9	349	.....	.....	1	.....	1	1	43	1386	35
St. James.....	1500	114	1614	.....	.....	2	.....	2	4	90	2638	70
St. Mary.....	1581	837	463	2881	.....	2	4	.....	6	4	111	2633	77
Grand Total.....	5516	2832	4031	2818	15797	5	7	15	10	37	23	467	133.9	343



CENTRE WARD.

Capital	500	500	500	500	1	1	7
Common	202	202	202	202	1	1	2
Commissioners	1395	1395	1563	1563	1	2	47
Craig	973	973	973	973	2	2	51
Custom House Square (East)	118	118	118	118	1	1	3
DeBresolles	325	325	339	339	1	1	7
Frothingham Lane	93	93	93	93	1	1	1
Fortification	948	455	1403	1403	4	4	38
LeRoyer	320	123	443	443	3	3	11
Notre Dame	143	35	1453	1453	1	1	79
Place d'Armes Hill	310	310	310	310	1	1	6
" " Sqr	214	214	165	165	1	1	12
St. Dizier	305	25	330	330	1	2	3
St. Francois Xavier	728	230	958	958	2	2	36
St. Gabriel	514	514	514	514	3	3	13
St. Jean Baptiste	1317	1317	2617	2617	1	3	17
St. James	513	513	513	513	4	5	125
St. Lambert Hill	60	18	1448	1448	2	2	14
St. Paul	578	189	787	787	2	5	78
St. Sulpice	3281	22	14913	14913	2	1	21
Total	4921	6358	16135	165149	4	7	2576

WESTWARD.

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Beaumont Boulevard	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	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No. 10. SCHEDULE showing the Pipes, Hydrants and Valves, &c., laid down.

ST. ANTOINE WARD.—Continued.

STREETS.	MAINS.										VALVES.												Hy- drants.	Services.	
	30	24	16	12	10	8	6	4	3	1½	Total.														
												Total.	1	2	3	4	5	6	7	8	9	10			11	12	13	14	15	16	17	18	19	20	Public.	Private.
Brought forward..	1940	18286	2299	345	19969	58194	253	44	2532	104300	..	..	1	19	5	2	36	94	4	..	161	128	32894
Redpath	1500	.....	.....	1500	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	2	3	.....	5
" Avenue	550	230	.....	780	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2	1	.....	2
Seigneurs	1813	112	.....	.....	1925	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	6	5	1	53
School House	220	.....	.....	220	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
Stanley	320	.....	.....	320	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35
Simpson	1493	.....	.....	1493	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
Sherbrooke	2873	.....	.....	.....	774	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32
Shuter	36	.....	.....	1555	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60
Summer Hill Ave.	1519	.....	.....	.....	354	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
St. Antoine	354	.....	.....	354	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	237
St. Alexandre	3606	2772	.....	.....	6378	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30
St. Catherine	1424	.....	.....	1424	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	120
St. David Lane	4472	2261	.....	.....	13032	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	120
St. Felix	765	.....	.....	765	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
St. Genevieve	981	.....	.....	984	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
St. James West	6769	1276	.....	.....	1276	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12
St. Lake	5549	.....	.....	12308	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
St. Michael Lane	1415	.....	.....	1415	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30
St. Mary	300	.....	.....	300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6
St. Monique	2168	.....	.....	2168	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	64
St.	172	.....	.....	172	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20

No. 10.—SCHEDULE showing the Pipes, Hydrants and Valves, &c., laid down.

S T. LOUIS W A R D.—Continued.

STREETS.	MAINS.										VALVES.										Hydrants.		Services.		
																					Total.	Public.		Private.	
	30	24	16	12	10	8	6	4	3	1½	Inch	Total.	30	24	16	12	10	8	6	4					3	2½
Brought forward..	1634	1630	3559	6050	...	1430	14303	...	...	...	...	1	4	8	...	...	14	22	...	555
Grothé	326	...	...	326	...	...	...	...	...	...	1	...	...	1	1	...	18
Lagauchetière	1636	52	...	...	1688	...	...	...	...	...	2	...	...	...	2	6	...	92
" Lane	180	180	...	...	...	...	...	...	...	...	...	...	...	...	6
Laberge Lane	140	...	...	140	...	...	...	...	...	...	1	...	...	1	...	...	7
Laval Avenue	620	...	...	1815	46	...	...	2481	...	...	...	...	1	1	...	...	...	2	3	...	27
Leduc Lane	190	190	...	...	...	...	...	...	...	...	...	...	...	...	8
Léon xiii Avenue	180	...	...	...	165	...	180	180	...	...	...	...	...	...	1	...	...	1	...	...	6
Market Square	180	180	...	...	...	...	...	...	...	...	...	...	...	...	5
Marie Louise Ave.	1615	...	...	1615	...	...	...	...	...	...	2	...	...	2	1	...	90
Mignonne	760	...	...	760	...	...	...	...	...	...	2	...	...	2	1	...	8
Napoleon	1700	89	...	...	1789	...	...	...	...	...	2	...	...	2	4	...	42	
Ontario	330	...	...	330	...	...	...	...	...	...	1	...	...	1	...	...	15
Perrault Lane	200	...	...	200	...	...	...	...	...	...	...	...	...	...	...	...	10
Pentaleon	175	...	...	175	...	...	...	...	...	...	1	...	...	1	...	...	10
Picard Lane	9	...	...	1054	...	...	...	...	...	2	...	...	...	3	...	...	18
Roy	1676	...	...	1045	64	...	...	3375	...	...	...	...	1	...	...	...	...	3	...	...	25
Shelbrooke	1645	...	...	...	...	...	...	...	3336	...	...	4162	...	...	...	...	...	...	1	...	...	4	...	...	197
Sanguinet	817	3470	...	...	3470	...	...	...	...	...	...	...	...	...	6	...	...	180
St. Constant	31	...	...	1725	...	...	...	...	...	2	...	...	...	2	...	...	198
St. Catherine	1634	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

... .. in Type Machine and Paper for ... and Supp.
 O. L. L. R. W. A. B. N. Continued.

Name	VAL. \$100.										By Order						
	8	6	4	2	14	Oct	Total	30	24	16	8	6	4	24	Total	Public	Private
Boat Forward	5949	166	12	24	5		37470	2	1	1	3	18	22	1	48	38	1120
Fullam Lane						485											
Gach						250	250										10
Grant			1615				9615						1		1		25
Harmony						230	230										5
Levell						150	150										3
Joachim Lane		405	570				1375						1		1	2	32
Kent						230	230										7
Lafontaine		1310	32				475										10
Laguchetiere		1345	244				1342			2					2	3	83
Lafayette Lane			150				1589									3	110
Logan		720	1457				150										5
Longueuil Ferry						250	2177			3					4	3	112
Matthieu Lane			446				250										3
Marianna						210	440									1	31
Mignonne		1750	154				240										12
Molson Terrace			220				1804			3					4	3	67
Munro Lane						250	220										19
Nonancourt			275				250										6
Ontario		4090	75				275										14
Pacific							4165					7			1	5	98
			4285				4285					1	2		3	5	43

Ontario	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111	1,111
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RECAPITULATION.

WARDS.	MAINS.												VALVES.												Hy- drants.		Services.
																									Public.	Private.	
	30	24	16	12	10	8	6	4	3	1½	Lead.	Total.	30	24	16	12	10	8	6	4	3	Total.					
East	3573	290	4738	7707	713	80	.....	17401	.....	.....	.....	.....	5	1	5	28	2	.....	41	32	1	737	
Centre	3281	32	4921	6318	161	35	165	11943	.....	.....	.....	.....	4	.....	7	20	7	.....	41	20	2	576	
West	634	956	401	678	6197	8886	886	.....	.....	.....	22557	.....	.....	.....	.....	2	8	1	11	20	18	.....	70	36	781	
St. Ann.	6786	19289	616	29945	56761	63	.....	1231107781	.....	.....	.....	.....	12	24	1	36	103	3	177	154	13	3360	
St. Antoine	1340	1272	1940	26983	10992	345	33169	102279	523	442	2582181967	1	4	1	31	13	2	55	172	5	.....	284	234	6	5681	
St. Lawrence	1674	4241	273	131	9	27679	.....	91652971	.....	.....	.....	.....	1	2	3	20	49	.....	75	77	.....	2688	
St. Louis	93	11194	650	18666	32162	.....	.....	321760891	1	.....	.....	.....	2	9	1	17	47	.....	77	88	.....	313	
St. James	60	2390	.....	27864	42373	.....	.....	62875797	.....	.....	.....	.....	2	1	30	62	.....	99	100	2	5020		
St. Mary	2385	5040	100	52	8338	.....	46173	37449	40	.....	2855102252	1	2	1	3	11	.....	67	77	1	133	109	6	4512		
Hochelaga	6165	.....	.....	9192	12179	.....	.....	45527991	.....	.....	.....	.....	3	.....	6	12	.....	29	31	.....	754		
Total	10193	6312	2694	36604	74360	6853	1842	433353	2096	557	12133	669445	4	6	3	53	81	10	243	583	36	11020	881	92	2729		
Rising Main.....	12936	29606	1674	.....	.....	.....	15	.....	.....	.....	.....	41225	6	23	1	2	.....	.....	2	.....	.....	.....	34	.....	.....	3
Exhibition Grounds	5484	.....	.....	.....	5484	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	4	.....	.....
Grand Trunk R. R., Pt.	
St. Charles	7737	1861	.....	.....	9598	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	.....
Total	23123	32918	2694	38278	74360	6853	191966	340678	2096	557	12133	725785	10	29	4	55	82	10	245	586	36	11037	885	92	27292		

* The quantities in this column are suspected to be a little in excess of the reality and will be corrected next year.

† In this quantity is included 2292 feet of 4 inches pipes.

No. 11.—SCHEDULE showing the average pressure in the City Mains during the year 1883.

MONTHS.	At W. Works Shop Languedochière st corn of St. Chas. Bourne	Central Fire Station Craig street.	Fire Station No. 2, St. Gabriel street.	Fire Station No. 3, Wellington st.	Fire Station No. 4, Chaboulez Sq.	Fire Station No. 5, St. Catherine st.	Fire Station No. 6, Ontario street.	Fire Station No. 7, Dalhousie Sq.	Fire Station No. 8, Craig street.	Fire Station No. 9, Centre street.	Fire Station No. 10, St. Catherine st.	Fire Station No. 11, Ontario street.	Fire Station No. 12, Seigneurs st.
1883													
January.....	65.00	.....	.....	75.00	71.00	54.00	60.00	.....	71.00	67.00	30.00	59.00	65.00
February.....	65.00	.....	.....	75.00	72.00	54.00	60.00	.....	72.00	67.00	30.00	62.00	65.00
March.....	65.00	.....	.....	75.00	71.00	54.00	60.00	.....	73.00	67.00	36.00	64.00	65.00
April.....	65.00	.....	.....	75.00	73.00	54.00	60.00	.....	72.00	70.00	30.00	65.00	65.00
May.....	65.00	.....	.....	75.00	74.00	54.00	60.00	.....	73.00	70.00	30.00	65.00	65.00
June.....	65.00	.....	.....	75.00	74.00	47.00	60.00	.....	70.00	70.00	30.00	60.00	65.00
July.....	65.00	.....	.....	75.00	73.00	47.00	60.00	.....	72.00	70.00	30.00	63.00	65.00
August.....	65.00	.....	.....	75.00	74.00	47.00	60.00	.....	72.00	70.00	30.00	65.00	65.00
September.....	65.00	.....	.....	75.00	75.00	47.00	60.00	.....	72.00	70.00	80.00	65.00	65.00
October.....	65.00	.....	.....	75.00	74.00	47.00	60.00	.....	72.00	70.00	30.00	65.00	65.00
November.....	65.00	.....	.....	75.00	74.00	47.00	60.00	.....	72.00	70.00	30.00	65.00	65.00
December.....	65.00	.....	.....	75.00	76.00	47.00	60.00	.....	.....	70.00	.....	65.00	65.00
Average 1883	65.00	.....	.....	75.00	73.00	50.00	60.00	.....	72.00	69.00	30.00	64.00	65.00
“ 1882	65.00	.....	45.00	75.00	73.00	50.00	60.00	.....	64.00	69.00	26.00	56.00	65.00

SCHEDULE No. 12.

showing the positions of Public Fountains erected in the
City of Montreal, up to 1884.

LOCALITY.	Cast Iron Basins.	Stone and Ce- ment Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.
St. Jacques Square				1			2
Dorchester			1				1
Market					2		2
Square						1	1
Flour Sheds				1		1	2
St. Jacques Square	2	1	2				5
Victoria Square			1			3	1
St. Lambert's Hill				1			1
and Dominion Sq.				1		1	1
and Visitation					1		1
and Common						1	1
and St. Lawrence				1		1	2
St. Anne's College street					1	1	1
St. Anne's Reservoir				1			2
St. Anne's and St. Paul st.	1			1		1	4
St. Anne's Reservoir				1			1
St. Anne's Weir					1	1	2
St. Denis					1	1	2
St. Champlain					1	1	2
Square					1	1	2
Square				1			1
St. Catherine						1	1
St. Anne's	2	1					5
Common				1		1	2
Square		2		1			3
St. Anne's Basin				1		1	2
St. Anne's near Drummond					1	1	1
St. Anne's and Guy					1	1	1
Market					4		2
St. Anne's Market				1		1	2
St. Anne's and Papineau Road					1	1	2
St. Anne's Market					1	1	2
St. Anne's East, near Suzanne				1		1	2
St. Anne's and Ottawa					1	1	2
St. Anne's south of Craig		1	2				9
St. Anne's north of Craig	3						4
Basin No. 1		1					1
do No. 2		1					14
St. Anne's			1	1			2
St. Anne's					2	6	6
St. Anne's and St. Patrick					1	1	2
	8	7	7	15	20	31	102

SCHEDULE No. 12.—*Continued.*

No.	At Exhibition Grounds.	Cast Iron Basins.	Stone and Cement Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.
1	Opposite Crystal Palace .....	.....	.....	.....	1	.....	.....	17
2	At Horse Ring .....	.....	.....	.....	.....	.....	.....	2
3	Distributed over grounds .....	.....	.....	.....	.....	.....	12	12
4	For Ice Water .....	.....	.....	.....	.....	12	.....	8
5	St. Urbain str. and Mount Royal Avenue .....	.....	.....	.....	.....	.....	1	1
6	Bleury street and Mount Royal Avenue .....	.....	.....	.....	.....	.....	1	1
7	Opposite Agricultural Buildings .....	.....	.....	.....	.....	1	.....	1
8	Distributed over grounds for fire purposes .....	.....	.....	.....	.....	.....	.....	4

TABLE showing the positions of Public Fountains erected in the City of Montreal, up to January 1884.

Location.	Cast Iron Basins.	Stone and Cement Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Urinals.	Water Closets.	Number of Jets.
1 Windmill Point	1	1	1	.....	3
2 Allan's Wharf	1	.....	.....	1	.....	2
3 Allan's Sheds	1	.....	.....	1
4 Custom House (opposite)	1	.....	1
5 King's Basin	1	.....	.....	.....	.....	3
6 Dominion Line	1	1	.....	.....
7 Jacques Cartier Square (foot of)	1	.....	.....	.....	.....	1
8 Beaver Line	1	1	.....	3
9 Donaldson Lane	1	.....	1
10 Longueuil Ferry	1	.....	1

MANAGEMENT.

—STATEMENT shewing the various details of the expenditure of the Montreal Water Works Department for the civic year ending December 31st 1883.

ADMINISTRATION—

AQUEDUCT.

	\$	cts.	\$	cts.	\$	cts.
digging and repairing fences.....	196	78				
along bridge approaches, banking bridges, &c.....	287	20				
digging ditches, repairing banks and earth work	237	24				
repainting, painting bridges, &c.....	144	89				
repairs to keeper's house.....	319	59				
entrance keeping guages, &c.	85	80				
removal of Weeds	136	60				
keeper's salary.....	600	00				
miscellaneous.....	7	60				
					2015	70

WHEEL HOUSE.

Superintendent, Chief Engineer.....	}	3880	00
Asst. Engineer, do			
do			
& Lecours, oilers			
Running Steam Engine.....		517	24
Repairs to Machinery		456	87
buildings, &c.....		821	42
Grounds.....		254	34
masonry of bridge at Lachine Weir.....		81	27
Repairs.....		129	03
Repairs, oils, tallow, &c.....		1054	08
			7194 25
Carried over.....			9209 95

Brought over.....

9209

ENGINE HOUSE.

Keeping in order Engine No. 1 and other repairs.....	974 90	
Keeping in order buildings & coal shed.	275 78	
Supplies, oil, tallow, &c.....	439 71	
Coal for steam	6997 78	
Wages running engine	3204 08	
Sundries.....	68 89	
Veary, engineer.....	1000 00	
	<hr/>	12961 14

TAIL RACE.

Repairs to fences and bridges.....	74 45	
New fences, Mullin street	336 56	
	<hr/>	411 01

PIPE TRACK.

Repairs to valve chambers.....	102 82	
Bridge over River St. Pierre.....	191 42	
Filling up Slope at St. Antoine St. on Atwater Avenue.....	77 23	
	<hr/>	371 47

RESERVOIRS.

Guardian's salary	700 00	
McTavish, repairs to valve house and fences	322 79	
do fuel and light	112 52	
do sundries	95 05	
	<hr/>	1230 36

HYDRANTS.

Inspecting, wages.....	2884 14	
Repairing, wages and materials	1729 44	
Thawing, horse and laborers	601 53	
	<hr/>	5215 11

PUBLIC FOUNTAINS.

Repairing, wages.....	435 22	
do materials.....	264 06	
	<hr/>	699 28

20888 3

Carried over

30098 3

DISTRIBUTION PIPES.

Repairs to mains, services and valves,	
wages	8679 51
Thawing pipes and carting water.....	1469 09
Inspecting service pipes inside of	
houses	1499 50
Repairs to footpaths and service	
boxes, wages	1782 83
Materials, iron, castings, lead, tin, &c.	106 82
" wood, planks, nails, &c.....	215 59
" bricks, cement, sand, &c.....	37 20
" rope, drain-pipes, &c	10 86

13801 40

WORK SHOP ON LAGAUCHETIERE ST.

Wages: foreman, clerk, turncocks,	
mechanics, laborers, carters and	
night watchman.....	5677 30
Instalment on premises.....	800 00
Timber, wood, coal oil, lamps, etc.....	31 99
Tools, pails, drinking cups, etc.....	347 26
Rent of foreman's house	140 00
Telephone and connection with police	
stations and City Exchange.....	245 30
Fuel and light.....	345 97
Sundries.....	113 88

7701 70

WORK SHOP AT WHEEL HOUSE

Wages, 3 mechanics	132 50
Materials, iron, copper, lead, etc.....	73 59
Sundries.....	147 54

353 63

METER DEPARTMENT

2 Meter inspectors.....	1414 05
Sundries for inspection	15 00
Testing and repairing meters	1475 09
Material.....	41 29

2945 43

24802 16

54900 48

Brought over.....		54900
ENGINE HOUSE AT McTAVISH ST.		
One stoker and one assistant engineer.	1022	72
Fuel for engine	1280	55
Oil, tallow, etc.....	164	72
Repairs to building and machinery ...	105	21
Sundries	29	23
Flag flooring for boiler house.....	125	00
	<hr/>	2726 43

MISCELLANEOUS.

Contingencies for office, drawing paper ink, colours, instruments, etc ...	177	24
Postage stamps, carters, sundries.....	162	67
Horse keep, superintendent	600	00
Map for distribution pipes, draughts- man and sundries	788	05
Damages	511	25
School taxes and assessment.....	3037	73
Replacing horse and harness for sup't.	195	00
	<hr/>	5471 94

STAFF.

Superintendent	3300	00
Assistant superintendant.....	2000	00
Clerk	900	00
Junior clerk.....	300	00
	<hr/>	6500 00
	<hr/>	14698
		<hr/>
		69598

LOANS.**PIPE LAYING.**

Wages	16536	41
Tin, lead pipes.....	3371	09
Copper, brass work	1385	74
Timber.....	176	68
Bricks	297	35
Drain pipes, cement and lime.....	224	88
Special castings ...	5134	02
Iron pipes ...	15820	73
Tools	314	85
Packing	79	57
Sundries.....	469	37
Meters	6110	26
Service stones and valve stones.....	285	45
	<hr/>	50206
		<hr/>
		119805

-SCHEDULE shewing the number of Assessed Dwellings, Stores
shops, Offices, Warehouses, Manufactories, Hotels, &c., in the
City of Montreal, for the year 1883-1884, with the Assessed
Water Rates thereon.

DWELLINGS

Tenanted.	Vacant and not supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
		\$5.00	26196	25820	376	
3274	107	5.75	100	96	4	\$28.25
3376	72	6.50	38	37	1	29.00
4154	55	7.25	120	120	....	29.75
3436	45	8.00	7	7	....	30.50
1855	10	8.75	28	28	....	31.25
1646	17	9.50	206	202	4	32.75
657	5	10.25	13	13	....	34.25
1582	17	11.00	5	5	....	35.75
205	....	11.75	74	73	1	36.50
1006	8	12.50	10	10	....	37.25
129	....	13.25	1	1	....	38.75
678	3	14.00	129	128	1	40.25
266	3	14.75	1	1	....	43.25
524	7	15.50	49	46	3	44.00
45	....	16.25	83	82	1	47.75
382	2	17.00	3	3	....	49.25
4	....	17.75	15	15	....	51.50
486	3	18.50	1	1	....	52.25
22	....	19.25	60	60	....	55.25
189	3	20.00	9	9	....	59.00
4	....	20.75	56	56	....	62.75
376	7	21.50	1	1	....	66.50
45	2	22.25	19	18	1	70.25
217	2	23.00	27	27	....	77.75
26	....	23.75	1	1	....	85.25
163	2	25.25	8	8	....	92.75
344	6	26.00	4	4	....	107.75
1	....	26.75	1	1	....	122.75
122	....	27.50	1	1	....	137.75
6	....				
25820	376		27366	26144	392	

No. 15. — SCHEDULE shewing the number of Assessed Dwellings, Stores Shops, Offices, Warehouses, Manufactories, Hotels, &c., in the City of Montreal, for the year 1883-1884, with the Assessed Water Rates thereon.

DWELLINGS

Number Assessed	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
3381	3274	107	\$5.00	26199	25820	376	
4048	3976	72	5.75	100	96	4	\$28.25
4209	4154	55	6.50	38	37	1	29.00
3481	3436	45	7.25	120	120	....	29.75
1865	1855	10	8.00	7	7	....	30.50
1653	1646	17	8.75	28	28	....	31.25
662	657	5	9.50	206	202	4	32.75
1599	1582	17	10.25	13	13	....	34.25
205	205	....	11.00	5	5	....	35.75
1014	1006	8	11.75	74	73	1	36.50
129	129	....	12.50	10	10	....	37.25
684	678	3	13.25	1	1	....	38.75
269	266	3	14.00	129	128	1	40.25
531	524	7	14.75	1	1	....	43.25
45	45	....	15.50	49	46	3	44.00
384	382	2	16.25	83	82	1	47.75
4	4	....	17.00	3	3	....	49.25
489	486	3	17.75	15	15	....	51.50
22	22	....	18.50	1	1	....	52.25
192	189	3	19.25	69	60	....	55.25
4	4	....	20.00	9	9	....	59.00
383	376	7	20.75	56	56	....	62.75
47	45	2	21.50	1	1	....	66.50
249	247	2	22.25	19	18	1	70.25
26	26	....	23.00	27	27	....	77.75
165	163	2	23.75	1	1	....	85.25
350	344	6	25.25	8	8	....	92.75
1	1	....	26.00	4	4	....	107.75
122	122	....	26.75	1	1	....	122.75
6	6	....	27.50	1	1	....	137.75
26196	25820	376		27266	26744	392	

RECAPITULATION

	Tenanted.	Vacant.	Total.
Dwellings	26874	392	27266
Stores, shops, offices	5575	282	5857
Hotels and taverns	363	.....	363
Total	32812	674	33486
Steam engines.....			124
Special charges on manufactories, etc			122
Horse stalls			850
Water closets.....			9021
Urinals			674
Horses			3988
Cows.....			502

CASH RECEIPTS BY THE WATER DEPARTMENT

During Civic year ending 31st December 1883.

For dwellings, shops, offices and hotels	\$334588 45
“ Water closets.....	31554 00
“ Urinals	862 50
“ Horses	7478 00
“ Cows.....	483 00
“ Horse stalls	1030 00
“ Steam engines	6559 00
“ Permits for hose to water streets, &c	428 00
“ “ for building purposes	1577 55
“ Private Fountains	196 00
“ Manufactories, etc.....	1033 00
“ Water supplied through meters outside the City limits.....	3209 50
“ Water supplied through meters inside the City limits.....	36719 87
	39929 37
“ Rent of meters outside City limits.	101 80
“ “ “ inside “ “	2006 11
	2107 91
	\$ 427826 78
Miscellaneous	4062 22
Costs.....	51 27
	\$ 431940 27
Less refunded	846 29
Net collections.....	\$ 431093 98
Amount return into the Treasury in 1882.....	414118
Increase.....	\$ 16971

CITY HALL

Montreal, March 1884

CHAS. LAPIERRE

Act. M. I

12 51
ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

Montreal Water Works,

FOR THE

YEAR ENDING 31ST DECEMBER 1884.

Printed by Order of the Water Committee.



Montreal;

LOUIS PERRAULT & Co., CITY PRINTERS.

1885

124

1. The first part of the document is a list of names and dates.

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in the

Louis Lesage,

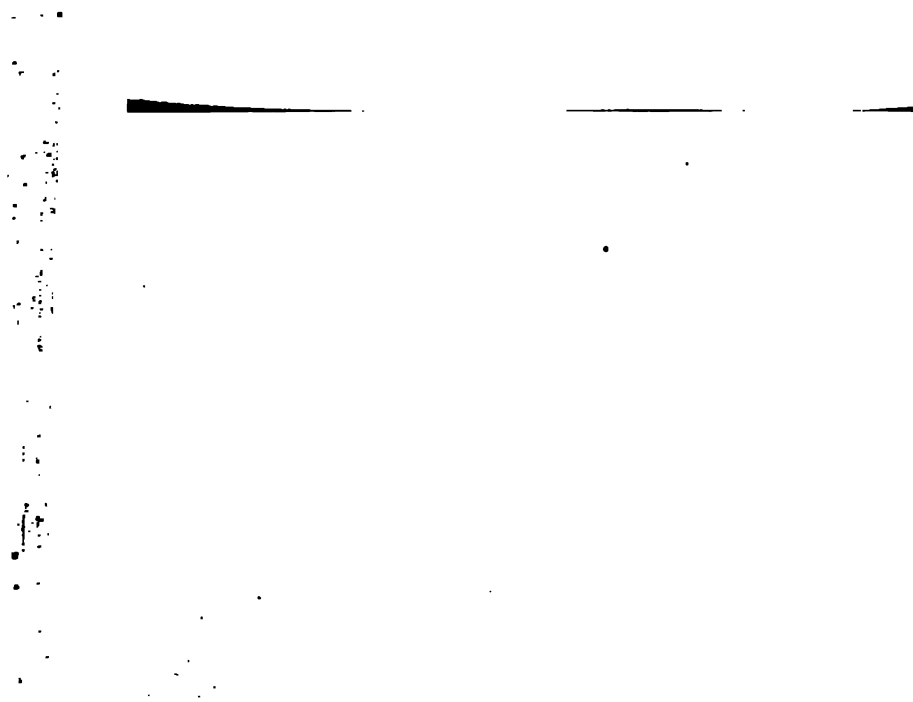
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ANNUAL REPORT
OF THE
SUPERINTENDENT OF THE MONTREAL WATER WORKS,
FOR THE
YEAR ENDING DECEMBER 31st, 1884

—)o(—

To the.

Mayor, Aldermen, and Citizens of the City of Montreal,

GENTLEMEN,

I beg to submit my annual report of my administration of the Water Works Department, together with the suggestions which my experience and knowledge of the works confided to my care prompt me to offer to your honorable council.

The following customary schedules which follow the report, will give in tabular forms the different operations of the year.

No. 1 schedule showing the duty of turbine wheel No. 1.

No. 2 schedule showing the duties combined of breast wheel and of turbine wheels Nos. 2 and 3.

No. 3 schedule showing the duty of steam engine No. 3.

No. 4 schedule showing the duty of high level service steam engine.

No. 5 schedule showing the depth of water, the rain fall and the mean monthly temperature at the Mc. Tavish Reservoir for the year 1884.

No. 6 schedule of repairs to mains, fire hydrants, valves and service pipes during the year 1884.

No. 7 comparative table showing the average daily consumption for each month and for each year from 1875 to 1884.

No. 8 schedule showing the different kinds and the sizes of water meters belonging to the city and to private parties.

No. 9 schedule showing the pipes, fire hydrants, valves, services, etc, laid in the city during the year 1884.

- No. 10 schedule showing a summary of the pipes, fire hydrants, valves, services, etc., laid in the city of Montreal up to 31st December 1884.
- No. 11 schedule showing the average pressure in the city mains during the year 1884.
- No. 12 table showing the position of public fountains erected in the city of Montreal up to 31st December 1884.
- No. 13 statement showing the various details of the expenditure in the management of the Montreal Water Works Department for the civic year ending 31st December 1884.
- No. 14 inventory of stock on hand January 1885.
- No. 15 schedule showing the number of assessed dwellings, stores, shops, offices, warehouses, manufactures, hotels, etc., supplied with water from the department for the year 1884 with the assessed value there of.
- No. 16 cash receipts by the Water Department during the civic year ending 31st December 1884.
- No. 17 plan of the City of Montreal showing position of all pipes, valves and hydrants belonging to the water works.

AQUEDUCT.

The Aqueduct has been maintained in an efficient state of operation during the past year.

All the repairs contemplated in my last annual report, such as repairs to slopes, farm bridges, fences, cleaning of ditches, have been done, with the exception of the culvert under the old aqueduct, which has been left in the same condition it was last year. I hope this will be attended to this year.

The stone abutments of the bridge near the settling basin, reported in my last report as being in a dangerous condition, have been partially demolished and rebuilt to their proper line and level. The old stone copings have been replaced by new ones, as the old stones had decayed. 2,350 lineal feet of fences, along the farms of Valier, Pigeon, Garry, and McArthur, have been altered into picket fence by using the old logs and splitting them into posts and rails. More alteration of the kind will require to be yearly done until the whole of the log fence has been converted into picket fence. The yearly repairs to ditches, bridges, fences, and slopes, which may have suffered by this winter's frost, will have to be at-

tended to. A few new stop-logs for the rock cut stop gates will be also required.

A good deal of brush wood which grows on the bank of the aqueduct and whose dead leaves in the fall are blown into the water of the aqueduct and cause trouble at the pumping works, has been cut, gathered into piles and burnt. It is proposed to continue this cutting next summer, until the whole of the banks are cleared of them.

WHEEL HOUSE AND PUMPING WORKS.

A good deal of repairs, some pretty heavy, had to be done to the buildings and pumping machinery during the last year. They are now in good order, and very little expenses will be required during this year to maintain them so.

For the details see, appended to my report, that of Mr. Kearney, the engineer in charge of these works.

The machine shop at the wheel house as usual, has proved an utility and economy in affording the facility with which the repairs to the pumping machinery and the new works for the pipe laying have been accomplished.

The following is the list of the new works turned out :

36	fire hydrants.		
4	hydrant bottoms.		
11	hydrant sockets.		
2	dozen of $\frac{3}{4}$ inch bolts and nuts.		
4	dozen of $\frac{5}{8}$ inch bolts.		
3	valves of 12 inches.		
3	"	10	"
22	"	6	"
23	"	4	"
2	dozen hydrant brass nuts.		
6	brass valve spindles of 6 inches.		
4	"	4	"
2	"	10	"
1,150	1 inch brass service caps.		
146	$1\frac{1}{2}$ inch brass service caps.		
50	$\frac{1}{2}$ inch couplings.		
251	service rods.		
277	patent pneumatic cocks.		

2 dozen brass stop cocks for iron pipes.
 194 $\frac{1}{2}$ inch three way stop cocks.
 155 $\frac{1}{2}$ " " "
 54 $\frac{5}{8}$ " " "
 378 $\frac{5}{8}$ inch nozles.
 12 hydrant watering nozles.
 24 $\frac{3}{4}$ inch water meter nipples.
 12 1 inch water meter couplings.
 8 $\frac{5}{8}$ " " "
 776 union water meter pistons turned.
 10 $\frac{5}{8}$ inch steel nozzle drills.
 6 $\frac{1}{2}$ " " "

5 air pumps for patent pneumatic cocks.

75 water meters repaired, 1 flanging machine, besides a considerable number of hydrants, street valves, etc., repaired.

Delivered from the brass foundry 8,319 lbs. of brass castings.

The total amount of water pumped by the water power during the year 1884 is 3,597,272,792 gallons, with an expenditure of \$7,558 48, as shown in schedule No. 13 under the head "Wheel House," making \$0.01243 per million of gallons raised 1 foot high (total lift taken at 169 feet). The total amount of water pumped by steam power at the wheel house during the same period is 314,182,908 gallons, with an expenditure of \$11,204.86, making \$0.211 per million gallons raised 1 foot high.

The following table shows the cost of raising 1 million gallons 1 foot high by water and by steam for the last ten years, and the average cost by each method for that period.

Year.	By water.	By steam.
1875	\$0.0200	0.119
1876	0.0140	0.144
1877	0.0158	0.080
1878	0.0106	0.170
1879	0.0093	0.119
1880	0.0120	0.123
1881	0.0136	0.121
1882	0.0118	0.258
1883	0.0135	0.134
1884	0.0124	0.211
Average of ten years.....	0.0133.....	0.148

INCREASE OF PUMPING POWER REQUIRED.

Owing to the peculiar position of the city the pumping is done partly by water and partly by steam power. It was the intention of the originator of these works that the pumping should be done by water, on account of the city's proximity to the Lachine Rapids, the water power of which, if properly utilized, is practically unlimited. But at the time of the construction of the aqueduct (thirty years ago) to have provided means for utilizing water power equal to the present pumping requirements would have involved an outlay beyond the then means of the city, necessitating, as it would have been, an aqueduct much larger than the present one, at that time judged quite adequate by the eminent engineers consulted. It was, however, soon found that this aqueduct owing to the rapid growth of the city was insufficient to furnish the power necessary to pump all the water required, especially in winter when the frost considerably reduces its capacity. To remedy this, steam power was resorted to as an auxiliary, and so far has been successful in attaining the object sought. For over 12 years this system has been going on with an economy which, taking into account the necessity of maintaining so much machinery, some of it useless, is questionable.

There are at present four water wheels with ten pumps of a total capacity of 13 millions of gallons, as much as the aqueduct when in its best condition (which is during the summer season for about six months) is able to furnish power for.

There are also three steam pumping engines with six pumps of a total capacity of 14 millions of gallons. Two of these engines, the first two erected (one in 1869 the other in 1871) proved failures and put the city to such expense and trouble by numerous accidents to pumps and crank shafts and by the bursting of mains due to bad action of the pumps, that in 1875 the Worthington engine was erected to supply their places, so that in reality the city cannot count more on steam power than 8 millions of gallons, the capacity of this last named engine.

Last year the consumption of water by the City during the hottest and the coldest weather has been nearly 12 millions of gallons daily.

From the foregoing explanations and in view of the rapid growth of the city, it is plain that before long the whole capacity

of the pumping machinery (especially that worked by steam) will be found inadequate.

As previously stated we cannot depend on steam power for more than 8 millions per 24 hours. This steam power is partially required in the winter to supplement the water power, which at that season cannot pump more than 4 millions of gallons per 24 hours.

This question of increased power for pumping has long been foreseen and your Council has adopted the project of a large aqueduct, a portion of which, that is about one quarter of its length, called "the Inland Cut," was constructed some ten years ago.

I feel it my duty to give due warning that the time has now come when the remaining portion to the wheel house, should be made.

I think it would be an economy to do the work slowly, say in three or four years, and to take advantage of the cheapness of labour at a time of slackness of work, and as there is a good deal of rock excavation to do the winter seasons could be utilized advantageously.

Should this work be longer delayed, it will be necessary to secure more steam power, and in my opinion this can best be attained by removing the two useless steam engines previously alluded to, and replacing them by an engine of the type and capacity of the Worthington now in use.

This will be necessary in order to provide against the contingency of a failure in the water supply at a time when, as in the winter season, the city depends mainly on the Worthington engine, now already nearly ten years in service. It is possible that in an emergency * the two engines referred to above as useless might with great caution be worked, and in view of this doubtful possibility they have, at considerable expense, been kept in order, but it is no longer prudent to trust to such precarious help, hence my suggestion for the alteration.

* Since the above was written, this emergency has occurred, it having become necessary to use one of these engines. The severity of the present winter has been such that the power of the aqueduct was so reduced by the thickness of the ice, that since the 13th March there has not been water power sufficient to pump more than a million and a half gallons per 24 hours into the Reservoir whilst the city was using 12 million gallons per day, a large part of which was wasted to prevent service pipes in houses from freezing.

It will be fortunate if the close of the winter finds us without serious accident to machinery or pumping mains.

TAIL RACE.

Nothing of importance has been done to the Tail Race. The fences have had the ordinary repairs. A few loads of stone were thrown against the North abutment of the iron bridge near the wheel house, to arrest the scouring action of the current on the foundations. The abutment having begun to settle, the Canadian Pacific R'y Co., to which the bridge belongs and which is responsible for its maintenance, was duly notified to see to it. As this occurred late in the season the company merely made temporary repairs to the superstructure, which had been distorted by the sinking of the abutments. It is proposed to repair the masonry next summer.

Every year during the spring high water, the banks of the Tail Race, at the point where the latter crosses the old bed of the river St. Pierre, suffer more or less from scour. This must be stopped or the banks will be rendered quite insecure. Action in the matter may however, without much danger, be deferred for some years, when perhaps the completion of the large aqueduct (necessarily involving an enlargement of the Tail Race) will afford an opportunity to rectify this defect. Apart from this, the Tail Race is in good order and will require a very small expenditure to keep it so during next season. The painting of the bridge at the Lower Lachine Road is the chief item.

PIPE TRACK.

This portion of the work is in the same condition as last year, except that a little more filling has been done on the hill on Atwater avenue at its crossing of St. Antoine street and above Dorchester street.

The pumping mains and their stop-valves have been maintained in good order, and free from accident. The stop valves have received their ordinary cleaning.

The brick tunnel on Moffat's hill is in a fair state of repair. Nothing has been done to it. The swing gate at its entrance put on a few years ago, has done good service in checking the action of frost on the brick work.

RESERVOIRS.

The reservoirs were maintained in good order and kept full during the year. The principal repairs were as follows :

At the McTavish reservoir the grounds have been kept good order. Trees were planted on Carleton avenue. Hawthorn seeds were planted inside the fence on McTavish street, Pine and Carleton avenues. Iron and wire railings round the reservoir were painted two coats; some grouting and pointing of the joints of the walls were done. The main drain on McTavish street was extended up to Pine avenue, and in Pine avenue to Allan's gate, thereby cutting off the dripping through the ground on the reservoir bank. The high level reservoir at the head of Peel street was emptied, cleaned, the joints of the masonry grouted and repaired, and the iron fence painted two coats. A portion of the overflow pipe for a distance of 114 feet was renewed by a cast iron 10 inch pipe.

Things are now in such a condition that very little will require to be done during next year, except to the valve house, which requires a new flooring, and an iron ladder to replace the old one in the well.

HIGH LEVEL SERVICE.

The pumping works for this service have been in constant operation during the year, and were maintained in good order.

The repairs done to these works were few and as follows:

Twenty new valve springs were put in engine pumps. A new heater of a larger capacity was put in place of the old one, thereby effecting a considerable saving in fuel. All the blow off pipes and cocks in the boiler were renewed; and, on test made by the boiler inspector, the boiler was declared in first class condition.

The roof of the coal shed will require some repairs as well as the steam chimney.

The oil cloth of the engine room will require renewal.

Some of the slates on the roof of the engine room and dwelling require to be repaired, and the windows and blinds to be painted.

Schedule No. 4 shows the work done by the engine, that is: 44,067,311 gall. pumped into Peel street reservoir in 3,022½ hours. The total cost was \$2,983.35.

The cost of raising 1 million gallons 1 foot high was:

In 1876	\$0.240
" 1877	0.253
" 1878	0.355
" 1879	0.283
" 1880	0.274
" 1881	0.226
" 1882	0.256
" 1883	0.286
" 1884	0.318

Average of 9 years 0.276

(Height of lift 418 — 205 = 213.)

PIPE LAYING.

The total length of cast iron pipes laid during the year was 9,427 feet, viz.:

3 feet of 12 inch, 709 feet of 10 inch, 5,200 feet of 6 inch, 3,515 feet of 4 inch; 36 valves: 1 of 12 inch, 3 of 10 inch, 17 of 6 inch, 13 of 4 inch, 2 of 3 inch, and 6 fire-hydrants. 651 houses have been supplied with water, out of which 182 through pneumatic stop-cocks. 45 feet of 6 inch and 174 feet of 4 inch cast iron pipes, one 6 inch and four 4 inch valves were laid for private corporations. This added to the amount laid up to 31st Dec., 1883, makes the total to 31st Dec., last, 23,123 lineal feet of 30 inch pipe, 32,918 of 24 inch, 2,694 of 16 inch, 38,281 of 12 inch, 75,069 of 10 inch, 6,850 of 8 inch, 197,166 of 6 inch, 344,193 of 4 inch and 2,095 of 3 inch cast iron pipes, and 12,700 feet of smaller mains, making a grand total of 735,089 lineal feet, or 139,772 miles of main pipes.

There are 10 valves of 30 inch, 29 of 24 inch, 4 of 16 inch, 55 of 12 inch, 84 of 10 inch, 10 of 8 inch, 262 of 6 inch, 599 of 4 inch and 28 of 3 inch, making a total of 1,091 stop valves.

There are 939 fire-hydrants including 52 private ones.

The number of houses supplied with water is 27,627.

Most of the old mains which I mentioned in my last years report as requiring to be replaced by larger ones, have been so replaced, a few however remain. These should be replaced next summer. They are a 3 inch pipe on Beaver Hall Hill, which should be replaced by a 6 inch, a 3 inch on Coté street by a 6 inch. The old 4 inch main on Chenneville street from Craig street to Lagauchetière street, and the old 4 inch on St. George street from Craig street to Juror street should both be replaced by 6 inch mains. With these alterations the distribution will be efficient for several years to come.

A new stop-cock for service pipes (called pneumatic, because operated by compressed air) has been introduced in the course of the year. By means of this invention it is purposed to get rid of the nuisance of the old stop-cock boxes hitherto used. The main-taining in order of these boxes, which are put under the side walk, is a matter of considerable expense, and accidents to pedestrians sometimes result from the boxes having been disturbed by frost. Another great inconvenience is that when footpaths are repaired or renewed these boxes are frequently covered and left inaccessible to the turnkey, who, if he wishes to get at the stop-cock, must tear up the planks, or break the asphalt, or remove flagstones, as the case may be. Often also the box becomes filled with gravel or earth, accidentally or purposely thrown into it, in which case it has to be dug up, an operation always expensive and particularly so in the winter.

It was to avoid these and many other inconveniences that the pneumatic stop-cock was invented. 182 of them were laid last summer, and so far have proved very successful.

The cost of laying a service with the new stop-cock, being cheaper than with the old, it is proposed to use the former, for the future.

The old hydrants with brick chambers are giving a good deal of trouble in winter, from their liability to freeze. Several years ago the non-freezing hydrants were introduced and are gradually taking the place of the old kind, being substituted for them as fast as these latter give way. Out of 936 fire hydrants in the city 177 are non-freezing, and I believe the sooner the change is completed the sooner will the cost of their maintenance be diminished. But this change will cost about \$35,000 and cannot be done all at once without taxing too greatly the city revenue. It had better therefore be done gradually.

I have added this year to this report a map of the city, indicating the positions of all the pipes, hydrants and stop-valves, laid in the city up to date.

MAINTENANCE OF DISTRIBUTION MAINS AND SERVICE PIPES, HYDRANTS AND PUBLIC FOUNTAINS.

The main pipes, service pipes, fire hydrants, and public fountains have been kept through the year in a good state of repair, the details of which are contained in the annual report of the water works foreman, Mr. Lagacé.

SERVICE PIPE INSPECTION.

The service pipe inspection in houses has been maintained as a previous years. On account of the extension of the city by the annexion of the Hochelaga ward, a new inspector has been added to the staff which consisted of three, and the city has been re-divided in four sections for this purpose. The visits of these inspectors show that there were found out of order: 1115 bib cocks, 72 urinals, 594 ball cocks, 134 closet cocks, 34 closet valves, 93 basin cocks, 41 water closets out of repairs, 416 service pipes burst, 169 service pipes on which leaks were indicated by sound; making a total of 2697 water fixtures found leaking, against 2,074 the previous year.

WATER WORKS SHOP.

The repairs done to the Work Shop on Lagauchetière street in 1881 were done with the view to delay for some years longer the construction of new buildings more suitable to the business of the department. The time has come when further repairs are scarcely possible and any further expenditure in that line is quasi a waste of money. Plans and estimates have already been prepared for the reconstruction of the buildings, and now that the annual instalments on the purchase of this property are completed. I think it is a suitable time to carry out the project. Otherwise extensive repairs are necessary to the roofs and a new tank for the testing of water meters, with considerable repairs to the testing building, are matters demanding immediate attention. In the plans for the new buildings this is amply provided for and it done now should be done in conformity with those plans and thus be so much towards the permanent work.

WATER METERS.

This particular branch of the service has received and continues to receive every year an increased attention from the department. This is found a powerful means to check the waste of water, or if wasted the city is not at the loss, As this, as well as the inspection of service pipes in houses, is under the special care of the Deputy Sup't, Mr. McConnell, I have appended his report as reference.

CONSUMPTION OF WATER.

The total amount of water pumped during the year is 3,911,455,700 gallons, making a daily average, as shown by schedule No. 7, of 10,637,037, that is an increase of 134,863 gallons over the daily average of 1883.

Of the above named quantity, 265,000,000 gallons (that is 253,000,000 gallons used in the city, and 12,000,000 gallons furnished to the outside municipalities) have been metered and paid for meter at rates; 955,000 gallons used for flushing sewers and flooding, rinks, &c., 2,070,000 gallons for fires, 36,039,600 gallons or at watering the streets, and about 12,059,000 gallons for public fountains. The amount used for supplying the fountains and latrines on the wharves about 9,100,000, for lubricating the steps of turbine wheels at the pumping works about 20,000,000.

The balance 3,566,232,100 gallons is that part of the City Consumption paid for at rates based on the assessed rental, and includes waste.

ADMINISTRATION.

The total cost of the administration, as will be seen by schedule No. 13 of the appendix, has been for the year 1884 \$76,411.83. This amount includes a sum of \$3,139.90 for the purchase of new water meters, which was not provided for in the appropriations at the beginning of the year, as heretofore this item was charged to pipe laying account. It is to be borne in mind that this portion of the expenditure is really an investment of capital yielding a return in revenue. This accounts for the apparent over-expenditure of the appropriation.

Efforts are made every year to bring down the expense of administration, or at least to keep it at the lowest percentage in comparison with the increasing revenue. So much has already been accomplished, that the latter is now sufficient to pay the cost of interest and of administration with a surplus, as follows:

Total cost of the works up to date.....	\$6,100,000
Interest at 6 per cent.....	\$366,000
Cost of administration for 1884	76,412
Total yearly cost of the Department.....	\$442,412
Total revenue Water Department for 1884.....	459,687
Excess of revenue over expenditure.....	\$17,275

The result of these efforts however, is a good deal modified by the cost of alterations and improvements, which experience and progressive ideas suggest. For instance, fire hydrants are gradually replaced by a better kind easier to keep in order ; alterations tending to reduce the cost of maintenance and remedy any defects, are also being gradually made in service pipes ; The connection by telephone of the different stations of the Departments of Police, Fire, and Water is another of these improvements which, though at first costly, are ultimately of undoubted economy. Much damage to property is avoided by timely reports telephoned to the Water Department, when any break occurs to pipes in the city, affording a chance to make repairs without loss of time.

From a report by the Chief operator of the Fire alarm telegraph, I find that 165 messages of that nature have been delivered to the Water Department during the year, and all at night.

Many other improvements might be enumerated, but enough have been mentioned to show that the expenses must be higher for some time until all are gradually completed and their beneficent results realized.

In view of the foregoing, I think it is wise not to restrict the Department in its progressive ideas, but to permit it as much as possible to perfect a system which in the future will lead to economy of administration.

In conclusion I have to thank the Water Committee for their intelligent and liberal help afforded me in the discharge of my duties, I must likewise give credit to the Deputy Supt. and to the Chiefs of the different branches of the Department for the attention paid to my directions and instructions.

The whole respectfully submitted,

LOUIS LESAGE,

Supt. of M. W. W.

Montreal, February 20th 1885.

**REPORT OF THE ASSISTANT SUPERINTENDENT OF WATER
WORKS IN LONDON AND LONDON SERVICE INSPECTOR
FOR THE YEAR 1900**

Submitted March 12th, 1901.

REPORT FOR THE YEAR 1900.

REPORT FOR THE YEAR 1900.

SIR,

REPORT.

The number of meters in use by the City at the end of the year 1900 was 484, of which 471 are owned by the Corporation and the other 13 are the property of the private water consumers. The number of meters in use at the end of the year 1900 was 484, of which 471 are owned by the Corporation and the other 13 are the property of the private water consumers. The number of meters in use at the end of the year 1900 was 484, of which 471 are owned by the Corporation and the other 13 are the property of the private water consumers.

There have been 15 meters removed during the year and from 15 meters removed the meters have been removed.

The meters have been made for fifteen years, such as damage resulting from frost or wear from long service, etc.

The actual number of meters damaged by frost during the year is 15, of which 15 were destroyed. The cost of repairs in most of these cases is charged to the tenant, or whose neglect of precautions against frost (in spite of timely warning from the Department) the damage is generally fine.

There were 36 new meters and some connections and parts of meters purchased at a cost of \$5,130 4s.

The total quantity of water pumped is.....3,911,455,700 Gallons.

That which brings no direct revenue is

as follows :

Flooding rinks etc.....	955,000		
Fires	2,070,000		
Watering streets.....	36,039,600		
Public fountains.....	12,059,000		
Harbour.....	9,100,000		
Lubricating steps of			
Turbines	20,000,000	80,223,600	"
<hr/>			
Balance, on which direct revenue accrues...		3,831,232,100	"
The quantity metered and paid for at meter rates is :			
In the City	253,000,000		
Outside the City.....	12,000,000	265,000,000	"
<hr/>			
Balance, being quantity paid for at rates based			
on assessed rental and including waste.....		3,566,232,100	"

The total revenue from water rates is.....\$459,879 17

The revenue from metered water is

For water	\$52,297.06	
" Rents of meters.....	2,964.55	55,261.61

Balance, being revenue from rates based on rental. . \$404,617.56

Total water from which revenue is derived.....3,831,232,100 gallons

" Revenue from same.....\$459,879.17

being equal to 12 cents per 1000 gallons.

Total water sold at rates based on rental.....3,566,232,100 gallons

" Revenue from same.....\$404,617.56

being equal to 11 $\frac{33}{100}$ cts per 1000 gallons.

Total water sold by meter.....265,000,000 gallons

" Revenue from same.....\$55,261.61

being equal to 20 $\frac{3}{100}$ cts, per 1000 gallons.

Showing the price realized per 10000 gallons, at rates based on rental to be 54 per cent of that at meter rates.

There was but one prosecution before the Recorder, for violation of the by-law in regard to meters.

The men employed on the meter service are 3 Inspectors. The Chief Inspector tests, connects and repairs the meters, keeping a record of the work of each from the beginning. Schedule No 8 is furnished by him and is a detailed inventory of meters in use and in stock. The other Inspectors visit all the meters in use once a month, take the readings and report to the head office every day. If any meter is found to be out of order the fact is reported to the Chief Inspector and by him remedied forthwith.

HOUSE SERVICE INSPECTION.

There are four house service Inspectors, to each of whom a certain district of the City is allotted and whose duty it is to visit each house in his district, inspect the water pipes and fixtures and report to the head office any found defective and in case a leak on the service in the street is suspected, to report the same to the work shop and have it examined.

This inspection in '84 showed the following defective fittings, viz :

Bib cocks	1115
Urinal do.....	72
Ball do.....	594
Stop do.....	29
Closet do.....	134
Basin do.....	93
Closet valves... ..	34
Closets out of order.	41
Water pipes burst	416
Sounds heard on pipes, as of leaks.....	169

Besides which there were found 9 taps left open to prevent freezing. 34 taps open to flush drains, 116 persons using water illegally for building purposes, 71 persons using hand hose illegally and 1 using a hydrant illegally.

The number of prosecutions at the Recorder's court in 1884, for violation of the by-law regulating water fixtures, was three.

The average loss from each defective fixture, as estimated by the Inspectors, is about $5\frac{1}{2}$ gallons per hour. This in the aggregate amounts to something very considerable and yet is but a small part of the waste which actually takes place, as was clearly shown by the midnight test which you made at the McTavish Reservoir in Nov. '83 and by similar tests made by me in Nov. '83 and Jan. '84.

The Inspectors of the meter and of the service inspection branches of the Department, have, each and all, performed their duties with commendable zeal as well as intelligence.

Your obdt. Servt.

B. D. McCONNELL.

Assistant Sup. M. W. W.

The only repair done to this building, was the painting of the roof. The ground floor is in a bad condition, and will require to be entirely renewed as early as possible next spring.

BRASS FOUNDRY

This building and plant are in first class order. It may be necessary during the year to rebuild the furnace, which can be done by our own men.

THE GROUNDS

The grounds are in good order, and will only require the ordinary attention. It will be necessary to replace twenty-five of the shade trees planted last spring, which did not take.

Nos. 1 & 2 ENGINE HOUSE

This building underwent no repairs, and is not likely to require any during the year.

No. 3 ENGINE HOUSE

Some repairs in the shape of carpentry work were done to this building; and the whole interior got two coats of paint and one of varnish. The doors, and the railing of the gallery were stained and grained, and the floor covered with linolium cloth, which adds very much to the neatness of the place.

THE BOILER HOUSE

Underwent no repairs, and from present appearance, will not require any.

THE COAL SHED

Two drains were laid in connection with this building, one of boulders, and the other of tile pipe, with the object of drawing the water from the foundation wall, in order to prevent the same from springing, by the action of the frost. Some slight repairs were done to the brick work. The platform scales in connection with this building were furnished with a new frame and platform.

THE DWELLINGS

Some slight repairs were done to my house, in the shape of running a partition across one of the rooms. I hope you will find it convenient this year, to remove the old wooden valve house, that serves as a kitchen and erect a proper kitchen in its place.

The roof of the men's stables, in rear of the dwellings, is in a bad condition it should be boarded and shingled anew.

The large platform scales and house attached, require some repairs. The roof should be graveled, and the scales furnished with a new frame work and platform.

No. 1 WHEEL

No repairs were done to this wheel other then the ordinary keeping up consequent upon running machinery, and unless some unforeseen accident occurs, is not likely to require much during the year.

No. 2 WHEEL

The repairs to this wheel were trifling consisting of the renewing of four iron gibs, in the upright arms, and the bushing of one of the valve guide pin.

No. 3 WHEEL

One of the valve chests of this wheel met with an accident on the 13th of Nov. The cause of which was manifestly due to a defect in the casting. The damaged one has been removed and a new one is now fast and will be placed in position in a few days.

No. 4 WHEEL

No repairs worth mentioning were done to this wheel. To the head race entrance were fixed copper wire gratings, which rendered valuable service in preventing the floating matter from getting into the wheels removing as far as possible the trouble before experienced, and complained of. The wooden platform of said head race, will require to be renewed.

Nos. 1 and 2 ENGINES

No repairs were done to these Engines. They get occasional runs from time to time and appear to work in their usual way.

These Engines, prior to the introduction of the Worthington Engines, have caused a good deal of trouble when necessary to work them and being found so unreliable that the Worthington Engine was acquired to do their work. But as this Engine has already had a good deal of service although still in good order, for all that, it must however be admitted

that it is more liable now to be deranged than when new, and in that case the City would have to resort to the Nos. 1 and 2 Engines which are not reliable. I think therefore that the time has come when these Engines should be removed and replaced by an Engine that would be serviceable when required.

No. 3 ENGINE

The steam valves and seats with the balance valves were refaced and properly adjusted, the valve rods being scored, were turned, and brass neck bushes fitted to the stuffing boxes of the steam chests. The drain pipes connected with the cylinders were overhauled, the worn-out portions removed, and replaced. The high pressure pistons were examined, and the rings set up. The engine steam trap and connections overhauled, and put in good working order. Sixteen broken pump valve springs were replaced. The air vessel, pumps and delivery pipes were varnished, and a portion of the movements and other parts, as well as the boiler feed pump, were painted, striped and varnished. The valve rods of the steam pump were turned, and brass neck bushes fitted to the stuffing boxes. The 30in. stop valve immediately outside the engine house was also put in good working order. The whole is at present in first class condition.

THE TUBULAR BOILERS

The tubular boilers not having been used during the year, are in the same order as when last reported.

No. 2 BATTERY OF BOILERS

On the 24th of March a leak sprung in the flue immediately over the fire in the center boiler of this battery, the cause of which, was found on examination to be due to a crack in the sheet. On further and closer examination the sheet was found to be cracked in six places, and the iron laminated. The whole sheet was removed and replaced by a new one of Bowling iron.

No. 3 BATTERY OF BOILERS

This battery gave good satisfaction, having performed its duty without interruption. A connection was made with the 30in. main and the whole boiler arrangement for a cold water feed, to be used when

hot water cannot be had. The expansion joints on the main line steam pipe were taken apart and remade. The safety valves, globe valves, gauge cocks, and connections, as well as the dampers and gearing of the same, were examined and put in proper working order.

THE PORTABLE STEAM PUMP AND BOILER

This apparatus was called into service on one occasion during the year, namely, to pump out the 30in. valve chambers on both sides of the Lachine Canal and performed its duty well, after which it was properly laid up and painted, and is now ready for immediate service when required. It will be necessary to provide a new set of grate bars for this boiler as the present ones are somewhat damaged.

In conclusion I beg to tender you my sincere thanks for the able assistance you so kindly rendered me in the discharge of my duty during the year.

The whole respectfully submitted.

I have the honor to be Sir,

Your most humble servant

DANIEL KEARNEY Engr.

Pumping Work

WATER WORKS SHOP, January, 1885.

TO LOUIS LESAGE, Esq.,

Superintendent Montreal Water Works.

SIR,

I respectfully submit the report of the repairs done to main pipes, stop valves, hydrants and service pipes. during the year ending December 1884, also some of the repairs required next year, which are as follows :

REPAIRS TO MAIN PIPES & VALVES

There has been one break on 10" main, corner of Sherbrooke & Aylmer streets, this pipe was found quite porous, and corroded through, also very thin on one side. There was one break on the 8" main corner St. George and Craig streets, caused by the settling of the earth, where a new drain was made across the pipe. This pipe although now laid since about the year 1850 is perfectly good yet There have been seven breaks on the 6" main, one of these was at the corner of Visitation & Mignonne streets. This pipe although good and sound, was split about four feet long. by the concussion caused by the too sudden closing of the fireman's cut-off at fires, another 6" pipe was split about five feet long at the corner of Notre Dame and Grant streets. and was found rather thin on one side. and very thick on the other, however it is quite strong yet, and will stand many years if proper care is taken in using the hydrants. This pipe was laid about the year 1850. Another 6" pipe was split by the frost on Fullum street, north of Ontario street where it crosses the creek, and I recommend that this pipe be sunk deeper to be safe from frost. The 6" main on Lagau-chetiere street corner of Anderson, also the 6" main on Beaver Hall corner of Belmont, broke owing to the sinking of the pipe. There was a hole in the 6" main on St. Catherine & Stanley street caused by a flaw in the casting. The 6" main in Fortification lane opposite the new building erected for the Canada Paper Company broke, owing to earth sliding away, when excavation was made for foundation of said building.

There have been six breaks on the 4" main. The principal cause of these leaks, are newly made cuts for drains, running across the pipe, and the settling of the earth breaks pipe at the edge of excavations. To the same cause may be attributed many of the leaks on service pipes. 14 joints were found blown out on the 12" mains, most of those being on Wellington street, between St. Etienne and Grand Trunk crossing. Those joints are found leaking generally at the fall and spring of the year. For the last two years, each joint which was repaired was marked, and in no case was the same joint found to be leaking twice. There were eleven joints repaired on 10" mains, the most of them being on the pipe on Dorchester street between St. Lawrence and Beaver Hall, twenty-seven six inch joints, and twenty-five four inch joints, were blown out during the year. The cause of so many joints being blown out, is the too sudden closing of the hydrants by the street watering men during the summer, also the firemen's cut offs.

One 8" one 6" and four four inch stop valves were renewed, also one 12", eight 6" and four 4" valves spindles. The 3" main on Beaver Hall Hill should be taken out, as it is now very old and useless, and all the service pipes on it, connected to the 6" main. The 3" main on Cote street, the 4" main on Cheneville from Lagauchetiere to Craig street, the 4" main on St. George street, from Vitre to Craig street, should also be taken out and replaced by 6" pipes. Those pipes have now become too small for the large consumption of water, and are unsafe.

The following is a list of stop valves which require renewing, as they are brass-faced on one side only, and cause a great waste of water; and a great deal of trouble, when repairs are needed in their vicinity.

Dorchester & St. Urbain, West side	10" valve	
Dorchester & St. Denis, West side.....	10"	
Dorchester & Amherst, East side	10"	—
Dorchester & Panet, East side.....	10"	—
Sanguinet & Craig.....	6"	—
Belmont & Beaver Hall.....	6"	—
Commissioner & Victor	6"	—
Panet South side, St. Catherine.....	6"	—
St. Constant & Craig	4"	—
Redpath & Sherbrooke.....	4"	—
Aylmer & Sherbrooke.....	4"	—
Logan & Visitation	4"	—
Visitation, South side, St. Catherine street.....	4"	—
St. Dominique, South side of Mignonne	4"	—
Wolfe St. North side of Craig	4"	—
Montcalm & Napoleon St	4"	—
William, East side of Dalhousie St.....	6"	—

HYDRANT REPAIRS

There were renewed 70 hydrant valves, 10 hydrant rods, the latter were broken by the contraction of the iron in very cold weather. Two broken hydrants were replaced by the same kind of hydrants, that is old kind hydrants, 13 old hydrants were replaced by non-freezing hydrants. Twenty new non-freezing hydrants were put in making a total of 177 non-freezing hydrants at present in the City, counting those of the new ward of Hochelaga.

During the winter of 1883, 1884, 105 hydrants were reported frozen 8·8 times, against 232, reported frozen 1857 times, the winter previous which shows a marked decrease. However the winter of 1883, 1884 was not so severe as the preceding, and enough snow fell to cover everything, before frost set in, which was a great protection to hydrants. I would also recommend that every shaft built for draining water courses, be placed at least eight feet from hydrant, when possible, as when placed any nearer, it is liable to cause hydrant to freeze. There are yet in position in the city 4 half moon, and two American hydrants, which should be replaced, as they are not reliable in case of fire. The following hydrants should be replaced by the non freezing hydrants as they are reported frozen every other day in winter.

Dorchester, corner St. Monique
 Lagauchetiere & Papineau Road
 St. Martin, South of St. Antoine
 Osborne & Windsor streets
 St. Paul & Jacques Cartier square
 Argyle avenue
 St. Antoine & St. Genevieve
 St. Catherine & Union avenue
 St. Famille, 1st above Sherbrooke
 St. Genevieve & Latour
 St. Famille, 1st
 Sherbrooke & Union avenue.

REPAIRS TO FOUNTAINS

The fountains will require the usual repairs next spring. The Court House fountain drain, will have to be dug and repaired, it is choked. Something will have to be done with the drinking tap-corner of Seigneur & Basin streets, as the proprietor of the building opposite wishes to have it removed.

REPAIRS TO SERVICES

Four hundred and ninety-five wooden boxes were replaced by iron boxes, 52 stop cocks were renewed, 85 couplings were found leaking, 56 service pipes were found leaking in foundation walls. These leaks in foundation walls are caused partly by the action of the lime on lead, and also by frost, 51 service pipes were found choked, and 441 service pipes were repaired for leaks, owing to various causes. Many of these service pipes, more especially those which were laid in the old wards of the City, were the cause of a good many of those leaks, on account of the old age of the pipes. The construction of new drains, coming in contact with the service pipes is another cause. The putting on of service plates, also the finding of stop-water boxes after new sidewalk is laid, has always caused considerable trouble and expense to the Department. If your new invention proves to be a success, we shall not then be troubled with sidewalk-stop-boxes and plates. This will be a decided improvement. 79 service pipes were frozen in foundation walls, and 101 were found to be frozen inside houses caused by very cold cellars. Our plumbers were called 215 times last winter for similar and other cases, four services were found frozen in the street, nine old stop cocks were replaced by pneumatic ones and 180 new services were laid with pneumatic-cocks.

The men under my charge with very few exceptions, have faithfully fulfilled their duties.

I am very grateful to you for the much valuable advice, you have given me, during the past year,

Respectfully submitted

Your obedient servant,

CHAS. LAGACE, Foreman.

No. 1—SCHEDULE SHOWING THE DUTY OF TURBINE No. 1.

MONTHS.	Time of Pumping.	Revolutions.	Gallons pumped.	Castor Oil.	Tallow.	Coal Oil.	Seal Oil.	Valvo-line.	Cotton Waste.	Coal for Heating.
	Hrs. M.									
IN POUNDS.										
1884										
January	739.40	532,221	124,007,193	112.50	26.00	165.75	8.87		24.00	.....
February	696.00	531,520	123,844,160	90.00	.....	131.75	12.00		23.50	63099
March	740.20	576,978	134,435,874	96.75	.....	133.87	.....		25.50	64730
April	715.45	602,276	140,339,308	128.25	40.00	129.62	40.00		29.00	38010
May	713.50	587,510	136,889,830	119.25	20.00	127.50	.....	30.00	26.44	15460
June	720.00	591,979	137,931,107	119.25	20.00	123.25	.....	.....	27.00	.....
July	713.30	593,444	138,272,452	146.25	.....	135.07	.....	.....	28.44	.....
August	732.25	580,257	135,199,881	182.25	52.00	145.25	.....	.....	27.44	.....
September	716.25	571,577	133,177,441	130.50	50.00	135.00	.....	15.00	26.00	.....
October	718.15	518,437	120,795,821	121.50	44.00	132.00	.....	15.00	26.00	19330
November	707.15	529,836	123,451,788	83.25	20.00	212.00	.....	60.00	25.50	40790
December	727.40	536,147	136,572,251	96.75	.....	220.00	.....	.....	26.00	66286
Total	8690.15	6,802,182	1,581,908,406	1,426.50	272.00	1,841.99	60.87	120.00	314.82	307726
Last Year	8085.10	6,360,084	1,481,899,572	1,299.62	372.00	1,572.67	281.00	30.00	206.35	518860

No. 2—SCHEDULE showing the duty of the Breast Wheel and of Turbines Nos. 2 and 3.

MONTHS.	Time of pumping.				Revolutions.		Gallons pumped.	IN POUNDS.		
	Breast Wheel.	Turbine	Turbine	Breast Wheel.	Turbine	Turbine		Castor Oil.	Coal Oil.	Cotton Waste.
		No. 2.	No. 3.		No. 2.	No. 3.				
1884	Hrs. M.	Hrs. M.	Hrs. M.							
January.....	739.25	.....	713.45	.....	539,346	.....	668,854	72.00	167.87	24.00
February.....	44.15	.....	655.35	.....	24,494	.....	733,977	56.25	133.87	23.00
March.....	161.50	3.50	190.40	2,626	125,657	2,626	195,369	20.25	70.12	15.00
April.....	720.00	720.00	115.10	544,535	590,720	544,535	122,927	144.12	144.50	34.00
May.....	723.45	75.35	697.15	588,964	59,689	911,072	174,352,836	129.00	131.75	27.25
June.....	720.00	224.10	720.00	585,503	173,117	889,944	188,638,944	153.00	127.50	32.75
July.....	741.45	736.40	742.45	567,401	504,995	834,608	230,476,996	213.75	138.12	34.19
August.....	733.30	727.35	742.00	561,320	485,729	838,468	226,899,500	234.00	151.87	32.50
September.....	708.10	656.25	720.00	530,778	428,259	846,674	214,751,440	168.75	135.00	32.56
October.....	740.15	741.00	714.00	535,083	471,885	787,162	216,727,196	150.75	183.00	31.00
November.....	710.45	318.15	710.00	537,054	203,754	826,683	180,734,322	99.00	212.00	28.00
December.....	715.50	.....	728.45	935,119	546,574	935,119	161,313,186	83.25	220.00	29.00
Total.....	7,459.30	4,206.30	7,479.55	5,732,794	2,874,589	8,590,857	2,012,364,386	1,521.12	1,815.10	343.25
Last Year.....	6,077.35	3,700.05	7,730.20	4,689,552	2,289,510	8,575,812	1,755,591,408	1,250.75	1,608.08	362.81

No. 3.—SCHEDULE showing the Duty of Steam Engine No. 3.

MONTHS.	Pump- ing Time.	Revo- lutions	Gallons pumped.	Coal used, pounds.			Average Pressure on Pump Pistons.	Castor Oil.	Coal Oil.	Seal Oil.	Val- voline.	Cotton Waste.
	H. M.			For Pumping.	For Banking Fire.	To raise 1,000,000 Gallons.						
IN POUNDS.												
1884												
January...	151.50	99,095	43,305,420	213,080	26,800	5,552	75	15.75	32.00	17.50	128.00	8.00
February...	361.25	220,160	95,989,760	492,240	45,110	5,598	75	24.75	56.00	21.87	256.00	17.00
March...	590.05	312,160	136,101,760	771,930	8,880	5,737	75	22.50	120.00	45.94	392.00	18.00
April...					1,630				12.25	4.37	8.00	
May...									16.00	10.94		
June...					8,660			2.25	16.00	17.50	8.00	4.00
July...												
August...	18.55	10,455	4,557,380	26,940	5,200	7,051		4.50	8.00	2.19	24.00	7.00
September...	6.30	4,026	1,755,336	10,490	2,560	7,434		2.25	16.00		8.90	8.00
October...	19.10	11,439	4,987,401	28,900	4,510	6,699		2.25	26.00	8.75	16.00	15.50
November...	21.10	14,019	6,112,284	34,210	4,470	6,328		4.50	16.00	13.50	32.00	7.00
December..	72.45	49,249	21,472,564	108,370	17,370	5,856		9.00	40.00	13.38	72.00	15.00
Total	1,211.45	720,603	314,182,908	1,686,160	125,190	5,765		87.75	358.25	155.94	914.00	99.50

No. 4.—SCHEDULE showing the Duty of High Level Service Engine.

MONTHS.	Pumping Time.		Revolutions.	Gallons pumped.	Coal used, pounds.				Average Pressure on Pump Pistons.	In Pounds.		
	H.	M.			For Pumping.	For Banking.	For Fitters.	To raise 1,000,000 gallons.		Castor Oil.	Valvoline.	Cotton Waste.
1884												
January	243.05		267,984	3,215,808	34,170	6,719	12,715	100	2.00	20.00	5.00	
February	233.00		251,098	3,013,176	30,393	6,353	12,197	100	2.00	24.00	4.00	
March	243.30		281,447	3,377,364	34,926	6,550	12,302	100	2.00	22.00	3.00	
April	222.00		236,736	2,840,832	27,705	5,972	11,855	100	3.00	21.00	6.00	
May	239.00		286,952	3,443,424	32,275	5,792	11,655	100	2.00	24.00	2.00	
June	268.30		384,635	4,184,310	38,824	6,237	10,769	100	2.00	36.00	3.00	
July	240.55		293,746	3,524,952	31,204	6,144	10,794	100	3.00	32.00	4.00	
August	231.35		339,297	4,071,564	34,298	6,203	9,947	100	1.00	28.00	4.00	
September	322.45		422,916	5,074,991	44,998	4,334	9,721	99	3.00	20.00	8.00	
October	250.30		305,613	3,667,716	33,549	6,401	10,892	100	7.00	30.00	3.00	
November	230.15		285,748	3,428,976	31,457	6,718	11,279	100	2.00	23.00	3.00	
December	271.25		352,014	4,224,168	40,474	7,252	11,299	100	2.00	19.00	5.00	
Total	3022.30		3,708,276	44,067,311	415,517	74,685	11,125	100	31.10	309.00	52.00	

No. 5.—**SCHEDULE** showing the depth of Water, the rain fall and the average temperature at 9 a. m. at McTavish Street Reservoir for the year 1884

MONTHS.	Average monthly Depth in feet.	Rain Gauges in inches.				Average tem- perature at 9 a. m.
		Rain.	Snow.	Snow reduced to Rain.	Total Rain.	
1884						
January.....	22.35	0.20	38.25	3.15	3.35	6.45
February.....	22.68	1.84	23.00	2.09	3.93	16.80
March.....	22.68	1.00	22.00	2.68	3.68	21.40
April.....	22.57	2.14	2.50	0.23	2.37	36.90
May.....	22.63	3.04	.....	.....	3.04	50.23
June.....	22.45	3.05	.....	.....	3.05	65.00
July.....	22.65	3.96	.....	.....	3.96	65.32
August.....	22.57	1.49	.....	.....	1.49	65.06
September.....	22.84	2.43	.....	.....	2.43	60.30
October.....	21.35	2.16	.....	.....	2.16	46.55
November.....	22.01	1.94	4.21	0.24	2.18	30.43
December.....	22.08	1.70	30.05	2.68	4.38	16.93
Total.....	.....	24.95	120.01	11.07	36.02	40.15
Last Year.....	.....	22.78	112.00	11.50	34.28	38.40

No. 6.—Repairs to Mains, Hydrants and Valves during 1884.

Item.	1st	2d	3d	4th	5th	Hydrant valves renewed.	Hydrants replaced by non freezing hydrants.	Hydrants replaced.	Hydrant Mains broken.
Main pipe broken.....	8	2	1	7	6				
Joint Mains out.....	14	11	0	17	15				
Stop Valves renewed.....	8	0	1	1	9				
Valve spindles renewed.....	0	0	0	0	4				
	25	12	2	43	35	70	13	2	10

REPAIRS, ETC., TO SUBURBANS.

Leaking over drains.	Couplings leaking.	Break in wall.	Cocks renewed.	Bows replaced by T way cocks.	Woods Bore replaced by iron one.	Pipes choked.	Other causes.
14	25	30	52	12	475	51	441

PIPES FROZEN, ETC., DURING THE WINTER 1883-84.

Pipes frozen outside.	Pipes frozen inside.	Pipes frozen in wall.	Other causes.	Number of places where water works plumbers were called during the winter 1883-1884.
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41 11 74 30 215

New patent hydrants put in during the year 1884 20
 New patent hydrants in position up to January 1884..... 168
 Pneumatic rocks put in during the year 1884 (new work)..... 183

Hydrants frozen during the winter commencing in December 1883 and ending in April 1884.

Dec.	Jan.	Feb.	March.	
63	370	249	134	Total... 105 hydrants 818 times.

No. 7.—COMPARATIVE TABLE showing the average daily consumption for each month and for each year, from 1875 to 1884, in the City of Montreal

	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
January.....	8,384,520	8,852,518	8,753,185	8,483,438	8,711,520	8,675,067	9,548,641	9,269,612	10,575,363	9,824,502
February.....	8,722,379	9,389,035	9,492,078	8,748,908	8,825,552	8,892,987	9,126,557	8,609,932	10,745,981	9,882,106
March.....	8,648,153	10,538,483	8,740,736	8,823,335	9,082,027	9,430,152	9,009,366	9,028,616	10,531,461	9,881,460
April.....	8,677,975	9,544,695	8,450,236	8,679,693	9,198,983	9,098,494	9,147,791	9,024,754	10,356,518	10,630,659
May.....	8,843,682	8,686,748	8,818,552	8,253,190	9,279,565	9,132,068	9,058,872	8,915,219	9,626,842	10,040,986
June.....	9,342,653	9,734,198	9,706,804	9,773,318	9,487,650	10,238,352	9,674,104	9,386,071	10,566,558	10,885,688
July.....	9,361,989	10,527,499	10,674,492	10,337,277	10,025,070	10,574,683	10,423,208	10,305,116	11,299,265	11,895,114
August.....	8,391,686	10,988,611	10,039,591	9,910,144	10,312,233	11,097,648	10,548,459	10,811,241	11,374,208	11,827,970
September.....	9,065,770	10,026,061	9,615,654	9,112,654	9,753,752	10,720,280	10,981,133	10,787,854	11,038,378	11,656,141
October.....	8,614,050	10,141,385	8,234,079	9,663,996	9,034,211	10,131,764	10,285,658	10,015,944	11,101,766	11,048,723
November.....	8,821,966	9,995,289	7,841,593	9,116,044	8,270,213	9,230,560	9,093,571	9,796,205	10,091,780	10,343,280
December.....	8,547,777	8,770,611	8,183,582	8,191,048	8,169,285	9,046,544	8,350,180	9,727,230	9,331,761	10,301,871
Daily average for each year.....	8,785,217	9,766,261	8,979,512	9,091,131	9,177,504	9,691,901	9,606,265	9,566,759	10,552,174	10,687,037
Incr. } over } Decr. } year } from }	575,809	981,044	.....	111,619	86,373	514,397	.....	.....	985,415	134,863
	.....	.....	786,749	.....	.....	.....	85,806	39,536	.....	.....

No. 8.—Summary showing the different kinds and sizes of Water Meters used.

KINDS.	Size in Inches.	Property of the City.				Private Property.				Grand Total.
		In the City.	Outside the City.	At the Workshop.	Total.	In the City.	Outside the City.	At the Workshop.	Total.	
Green	10			1	1					1
" " " " " "	8	3	2	1	6					6
" " " " " "	4	10	2	6	18					18
" " " " " "	2	24		1	25	5			5	28
" " " " " "	1	31		4	35	8			8	43
" " " " " "	1/2	7		4	11	4		1	5	16
" " " " " "	1/4	2		5	7	2			2	9
" " " " " "	1/8	2		4	6	3		1	4	16
" " " " " "	3/16	9		65	74	1		2	3	77
Union				1	1					1
" " " " " "	1	1		1	2	1			1	3
" " " " " "	2 1/2	27		4	31	1			1	32
" " " " " "	3	90		37	127	4		1	5	132
Rotary Union				2	2					2
" " " " " "	1	1			1			1	1	2
" " " " " "	1 1/2	1			1					1
" " " " " "	2	3		2	5					5
" " " " " "	3	1		2	3					3
" " " " " "	4	12		12	24					24
" " " " " "	6	1		1	2					2
Crown			1		1					1
" " " " " "	1 1/2	1			1					1
" " " " " "	2	1		1	2					2
" " " " " "	3	1		1	2					2
" " " " " "	4	1		1	2					2
" " " " " "	6	1		1	2					2
" " " " " "	8	1		1	2					2
" " " " " "	10	1		1	2					2
" " " " " "	12	1		1	2					2
" " " " " "	14	1		1	2					2
" " " " " "	16	1		1	2					2
" " " " " "	18	1		1	2					2
" " " " " "	20	1		1	2					2
" " " " " "	22	1		1	2					2
" " " " " "	24	1		1	2					2
" " " " " "	26	1		1	2					2
" " " " " "	28	1		1	2					2
" " " " " "	30	1		1	2					2
" " " " " "	32	1		1	2					2
" " " " " "	34	1		1	2					2
" " " " " "	36	1		1	2					2
" " " " " "	38	1		1	2					2
" " " " " "	40	1		1	2					2
" " " " " "	42	1		1	2					2
" " " " " "	44	1		1	2					2
" " " " " "	46	1		1	2					2
" " " " " "	48	1		1	2					2
" " " " " "	50	1		1	2					2
" " " " " "	52	1		1	2					2
" " " " " "	54	1		1	2					2
" " " " " "	56	1		1	2					2
" " " " " "	58	1		1	2					2
" " " " " "	60	1		1	2					2
" " " " " "	62	1		1	2					2
" " " " " "	64	1		1	2					2
" " " " " "	66	1		1	2					2
" " " " " "	68	1		1	2					2
" " " " " "	70	1		1	2					2
" " " " " "	72	1		1	2					2
" " " " " "	74	1		1	2					2
" " " " " "	76	1		1	2					2
" " " " " "	78	1		1	2					2
" " " " " "	80	1		1	2					2
" " " " " "	82	1		1	2					2
" " " " " "	84	1		1	2					2
" " " " " "	86	1		1	2					2
" " " " " "	88	1		1	2					2
" " " " " "	90	1		1	2					2
" " " " " "	92	1		1	2					2
" " " " " "	94	1		1	2					2
" " " " " "	96	1		1	2					2
" " " " " "	98	1		1	2					2
" " " " " "	100	1		1	2					2
" " " " " "	102	1		1	2					2
" " " " " "	104	1		1	2					2
" " " " " "	106	1		1	2					2
" " " " " "	108	1		1	2					2
" " " " " "	110	1		1	2					2
" " " " " "	112	1		1	2					2
" " " " " "	114	1		1	2					2
" " " " " "	116	1		1	2					2
" " " " " "	118	1		1	2					2
" " " " " "	120	1		1	2					2
" " " " " "	122	1		1	2					2
" " " " " "	124	1		1	2					2
" " " " " "	126	1		1	2					2
" " " " " "	128	1		1	2					2
" " " " " "	130	1		1	2					2
" " " " " "	132	1		1	2					2
" " " " " "	134	1		1	2					2
" " " " " "	136	1		1	2					2
" " " " " "	138	1		1	2					2
" " " " " "	140	1		1	2					2
" " " " " "	142	1		1	2					2
" " " " " "	144	1		1	2					2
" " " " " "	146	1		1	2					2
" " " " " "	148	1		1	2					2
" " " " " "	150	1		1	2					2
" " " " " "	152	1		1	2					2
" " " " " "	154	1		1	2					2
" " " " " "	156	1		1	2					2
" " " " " "	158	1		1	2					2
" " " " " "	160	1		1	2					2
" " " " " "	162	1		1	2					2
" " " " " "	164	1		1	2					2
" " " " " "	166	1		1	2					2
" " " " " "	168	1		1	2					2
" " " " " "	170	1		1	2					2
" " " " " "	172	1		1	2					2
" " " " " "	174	1		1	2					2
" " " " " "	176	1		1	2					2
" " " " " "	178	1		1	2					2
" " " " " "	180	1		1	2					2
" " " " " "	182	1		1	2					2
" " " " " "	184	1		1	2					2
" " " " " "	186	1		1	2					2
" " " " " "	188	1		1	2					2
" " " " " "	190	1		1	2					2
" " " " " "	192	1		1	2					2
" " " " " "	194	1		1	2					2
" " " " " "	196	1		1	2					2
" " " " " "	198	1		1	2					2
" " " " " "	200	1		1	2					2
" " " " " "	202	1		1	2					2
" " " " " "	204	1		1	2					2
" " " " " "	206	1		1	2					2
" " " " " "	208	1		1	2					2
" " " " " "	210	1		1	2					2
" " " " " "	212	1		1	2					2
" " " " " "	214	1		1	2					2
" " " " " "	216	1		1	2					2
" " " " " "	218	1		1	2					2
" " " " " "	220	1		1	2					2
" " " " " "	222	1		1	2					2
" " " " " "	224	1		1	2					2
" " " " " "	226	1		1	2					2
" " " " " "	228	1		1	2					2
" " " " " "	230	1		1	2					2
" " " " " "	232	1		1	2					2
" " " " " "	234	1		1	2					2
" " " " " "	236	1		1	2					2
" " " " " "	238	1		1	2					2
" " " " " "	240	1		1	2					2
" " " " " "	242	1		1	2					2
" " " " " "	244	1		1	2					2
" " " " " "	246	1		1	2					2
" " " " " "	248	1		1	2					2
" " " " " "	250	1		1	2					2
" " " " " "	252	1		1	2					2
" " " " " "	254	1		1	2					2
" " " " " "	256	1		1	2					2
" " " " " "	258	1		1	2					

No 9.—SCHEDULE showing the Pipes, Hydrants, Valves, Services, etc., laid in the City of Montreal, during the year 1884.

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.				Number of Valves.					Hydrants.	Houses supplied.	Length of Lead Pipes in feet.	Brass Stop Cocks	Pneumatic stop Cocks.	
	Length in feet of Cast Iron Pipes.			Total.	Number of Valves.										
	12 in.	10 in.	6 in.		4 in.	6 in.	4 in.	3 in.	Total.						
<i>East Ward.</i>															
Jacques-Cartier Square												1	97	1	...
St. James												1	74	1	1
Notre-Dame												2	75	2	1
Champ-de-Mars.												7	111	4	...
Claude												1	21	1	...
Commissioners												1	32	1	...
Barrack				90	90							1	33	1	...
Lacroix			104	52	156			2	2	4		1	23	1	...
St. Louis												1	11	1	...
Dalhousie Square.												1	41	1	...
Total			104	142	246			2	2	4		17	518	14	2
<i>Centre Ward.</i>															
Notre-Dame			137	18	155			2		2		2	23	1	1
Common												1	22	1	...
Champ-de-Mars.								1		1		...	...	...	...
Total			137	18	155			3		3		3	45	2	1

SCHEDULE showing the Pipes, etc., laid down.—Continued.

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.				Number of Valves.						Hydrants.	Houses supplied.	Length of Lead Pipes in feet.	Stop Cocks.	Pneumatic Cocks.
	12 in.	10 in.	6 in.	4 in.	Total.	12 in.	10 in.	6 in.	4 in.	3 in.					
	12 in.	10 in.	6 in.	4 in.	Total.	12 in.	10 in.	6 in.	4 in.	3 in.					
Brought forward															
Jurors	800	.....	800	.....	.....	.....	1	.....	.....	14	304	11	.....
Bleury	81	.....	81	.....	.....	3	.....	.....	.....	1	41	1	.....
St. Urbain	4	133	4	.....
St. George	2	25	1	.....
Vitré	1180	.....	.....	1180	.....	.....	4	.....	4	.....	.....	.....	.....	.....
Berthelot	90	.....	.....	90	.....	.....	1	.....	.....	.....	4	81	4	4
Evans Lane	1	9	2	.....
St. Edward	1	.....	.....	3	43	3	3
Concord	216	.....	.....	216	.....	.....	.....	.....	.....	.....	3	44	3	3
Launachetière	2	88	2	2
Park Avenue	12	108	12	12
St. Bernard
Total	2070	29	2367	.....	2367	8	2	.....	.....	10	.....	46	879	43	24
St. Louis Ward.															
St. Hypolite	6	124	6	3
German	5	226	5	.....
Sanguinet	18	367	12	2
Rivard	2	45	2	.....
St. Dominique	8	135	8	7
Grothé	3	44	3	.....
St. Denis	153	.....	.....	153	.....	.....	.....	.....	.....	.....	1	78	1	.....

St. Constant.....	618	648	2	.....	.....	.....	.....	.....	.....	12	261	12	11
Albina.....	504	504	.....	.....	.....	.....	.....	.....	.....	8	208	4	6000
Drolet.....	.....	81	.....	.....	.....	.....	.....	.....	.....	8	248	4	.....
Charlotte.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Lawrence.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	64	4	3
Roy.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	43	1	.....
Cadioux.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	54	1	.....
Craig.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	54	1	.....
St. Elizabeth.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	42	2	.....
Laval Avenue.....	108	108	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	1260	234 1494	3	.....	.....	.....	.....	.....	.....	82	1993	65	26
St. James Ward.													
Montcalm.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Berri.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12	228	7	.....
Barclay.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	400	8	2
Jacques Cartier.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	17	1	.....
Amherst.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	141	6	3
Beaudry.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	55	.....	.....
Ontario.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68	3	.....
St. André.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	71	1	.....
Craig.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	329	7	.....
Mignonne.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	31	1	.....
Campout.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	72	8	.....
St. Christophe.....	.....	72	2	.....	.....	.....	.....	.....	.....	2	34	1	.....
St. Catherine.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	241	6	3
Visitation.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	62	4	4
St. Hubert.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	101	2	.....
Lagauchetière.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	103	2	.....
Cherrier.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	103	7	6
Dorchester.....	684	684	1	.....	.....	.....	.....	.....	.....	5	285	5	4
Brock.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	147	3	.....
Total.....	684	72 756	1	.....	.....	.....	.....	.....	.....	2	22	2	.....
										103	2510	77	30

SCHEDULE showing the Pipes, etc., laid down. - Continued.

NAME OF STREET.	Length in feet of Cast Iron Pipes.				Number of Valves.				Hydrants.	Houses supplied.	Length of Lead Pipes in feet.	Brass Stop Cocks.	Pneumatic Cocks.	
	12 in.	10 in.	6 in.	4 in. Total.	12 in.	10 in.	6 in.	4 in. 3 in. Total.						
St. Mary's Ward.														
De-Maisonneuve	8	145	8	6	.....
Champlain	7	151	6	4	.....
Fullum	2	58	2	...	.....
Shaw	3	76	3	2	.....
St Catherine	9	339	7	1	.....
Volleagues	1	24	1	...	.....
St Germain Lane	72	72	.....	.....	.....	.....	.....	2	65	2	...	.....
Guin	8	114	4	...	.....
Erie	2	38	1	...	.....
Archambault	117	.....	117	.....	.....	.....	.....	1	18	236	9	...	.....
Pand	13	234	7	...	.....
Plessis	12	284	10	6	.....
Parker Lane	176	176	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Papineau Road	5	123	3	...	.....
Laguacheville	1	.....	.....	.....	.....	.....	.....	.....
Mignonne	18	416	18	17	.....
Lafontaine	6	83	3	...	.....
DeLormier	333	.....	333	.....	.....	1	.....	1	2	46	1	...	.....
Kent	2	6	2	...	.....
Morin Lane	6	80	3	...	.....
Rivet lane	1	21	1	...	.....
Total	450	248	698	.....	.....	2	.....	1	125	2594	91	35	.....

SCHEDULE showing the Pipes, etc., laid down.—Continued.

RECAPITULATION.

NAMES OF WARDS.	Length in feet of Cast Iron Pipes.				Number of Valves.						Hydrants.	Houses supplied.	Length of Lead Pipes in feet.	Brass Stop Cocks.	Pneumatic Cocks.
	12 in.	10 in.	6 in.	4 in.	Total.	12 in.	10 in.	6 in.	4 in.	3 in.	Total.				
East.....	104	142	246	...	...	2	2	...	4	17	518	14	2
Centre.....	137	18	155	...	...	3	...	...	3	3	45	2	1
West.....	...	423	...	...	423	...	2	...	...	...	2	9	240	9	2
St. Ann's.....	...	286	24	...	310	...	...	1	...	...	1	30	650	25	12
St. Antoine.....	3	...	300	1109	1412	1	1	1	...	...	3	148	4718	128	47
St. Lawrence.....	2070	297	2367	...	...	8	2	...	10	46	879	43	24
St. Louis.....	1260	234	1494	...	...	3	...	...	3	82	1983	65	26
St. James.....	684	72	756	...	...	1	1	...	2	103	2510	77	30
St. Mary's.....	450	248	698	...	...	2	...	...	2	125	2504	91	35
Hochelaga.....	171	396	566	...	...	...	4	1	5	87	2363	55	3
Grand Total.....	3	709	5200	2315	8227	...	...	...	...	...	...	...	10510	509	189

WARDS.	MAIN PIPES.											VALVES.											Hydrants.		Services			
																							Public.	Private.				
	30	24	16	12	10	8	6	4	3	1½	Lead Pipes.	Total.	30	24	16	12	10	8	6	4	3	Total.	Public.	Private.				
East.....					3873	290	4842	7849	713	80	17647					5	1	7	30	2		45	32	1	732	*		
Centre.....					3281	22	5058	4376	161	35	165	16068					4	10	26	7		47	20	2	579			
West.....			654		956	1024	678	6197	8886	585		22980				1	2	10	1	11	29	18	72	36		790		
St. Ann's.....					6786	19576	615	29609	56761	53		1231	168094				12	24	1	37	100	3	1	178	154	15	3390	
St. Antoine.....	1340	1272	194		26956	10952	345	35450	108388	523	442	2682	183369	1	4	1	32	14	2	66	172	5		287	236	6	5829	
St. Lawrence.....	2135				1674	4241	3273	15229	27876			910	55338					1	2	3	28	51		85	77		7334	
St. Louis.....	1645				93	11196	1653	17126	32296			321	67295	1				2	0	1	20	47		80	88		3235	
St. James.....	2488				60	2196		25548	4214			620	76551	1				2	2	1	31	64		101	100	2	5123	
St. Mary's.....	2585	5640	109		52	8338		46639	37297	60		2856	102956	1	2	1	3	11		69	57	1		135	110	6	4037	
Hochelaga.....					6105			9363	13571			455	29557					3		5	16	1		25	34		841	
Total.....	10193	8312	2694	36607	75060	6553	189414	533816	2095	557	12183	678876	4	6	3	54	84	10	264	592	37	1	1055	887	32	27910		
Rising Mains.....	12936	26600		1674			15				41225	6	23	1	2			2					34			3		
Exhibition Grounds.....								5184			5480								3			3		4				
Grand Trunk Railway.....							† 7737	1861			9098														20			
Point St. Charles.....																												
Total.....	13123	32918	2694	38281	75069	6853	197166	544193	2095	557	12133	735182	10	29	4	56	84	10	266	595	37	1	1092	891	52	27913		

* The quantities in this column are suspected to be a little in excess of the reality and will be corrected next year.

† In this quantity is included 2292 feet of 6 inch pipe.

No. 11.—SCHEDULE showing the average pre-sure in the City Mains during the year 1884.

MONTHS.	1881														
	At W. Works Shop Languechettère st, cor. of St. Charles Borromée.	Central Fire Station Craig street.	Fire Station No. 2, St. Gabriel street.	Fire Station No. 3, Wellington st.	Fire Station No. 4, Chaboulliez Sq.	Fire Station No. 5, St. Catherine, st.	Fire Station No. 6, Ontario street.	Fire Station No. 7, Dalhousie Sq.	Fire Station No. 8, Craig street.	Fire Station No. 9, Centre Street.	Fire Station No. 10, St. Catherine st.	Fire Station No. 11, Ontario street.	Fire Station No. 12, Belgheurs st.	Fire Station No. 13, Deseray street.	
January	65.00	.....	.....	75.00	75.00	45.00	60.00	.....	72.00	70.00	30.00	65.00	65.00	.....
February	65.00	.....	.....	75.00	75.00	45.00	60.00	.....	72.00	70.00	30.00	65.00	65.00	.....
March	65.00	.....	59.60	75.00	75.00	45.00	60.00	.....	73.00	70.00	36.00	64.00	65.00	.....
April	65.00	.....	57.00	75.00	75.00	48.00	60.00	.....	72.00	70.00	30.00	65.00	65.00	.....
May	65.00	.....	52.00	75.00	75.00	50.00	60.00	.....	72.00	67.00	30.00	66.00	65.00	.....
June	65.00	72.00	53.00	75.00	75.00	50.00	60.00	52.00	72.00	67.00	30.00	67.00	65.00	.....
July	65.00	72.00	52.00	75.00	75.00	50.00	60.00	50.00	72.00	67.00	30.00	67.00	65.00	.....
August	65.00	72.00	51.09	75.00	74.00	50.00	60.00	52.00	72.00	67.00	30.00	68.00	65.00	.....
September	65.00	72.00	57.00	75.00	75.00	50.00	60.00	52.00	72.00	67.00	30.00	67.00	65.00	.....
October	65.00	72.00	54.00	75.00	74.00	50.00	60.00	52.00	72.00	67.00	30.00	67.00	65.00	66.00	
November	65.00	72.00	56.00	75.00	73.00	50.00	60.00	53.00	71.00	66.00	30.00	67.00	67.00	67.00	
December	65.00	74.00	56.00	75.00	76.00	47.00	54.00	54.00	71.00	69.00	.....	67.00	66.00	66.00
Average 1884	65.00	72.60	.....	75.00	75.00	48.00	60.00	52.00	72.00	68.00	30.00	66.00	65.00	66.00
“ 1883	65.00	.....	55.00	75.00	73.00	50.00	60.00	....	72.00	69.00	30.00	64.00	65.00	.....

SCHEDULE No. 12.

TABLE showing the positions of Public Fountains erected in the City of Montreal, up to January 1885.

LOCALITY.	Cast Iron Basins.	Stone and Cement Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.	
1. Over Hall Square				1			2	
2. Curcy and Dorchester			1				1	
3. St. Jacques Market					2		2	
4. St. Antoine Square						1	1	
5. St. Joseph House Square				1		1	1	
6. St. Joseph House Square	2	1	2				5	
7. St. Joseph at Victoria Square			1			3	1	
8. St. Joseph opposite Drill Hall				1			1	
9. St. Joseph and Dominion Sq.				1			1	
10. St. Joseph and Visitation					1		1	
11. St. Joseph Nuns and Common						1	1	
12. St. Joseph and St. Lawrence				1		1	1	
13. St. Joseph Market and College street					1	1	1	
14. St. Joseph Level Reservoir				1			2	
15. St. Joseph Cartier Sq. and St. Paul st.	1			1		1	4	
16. St. Joseph Tavisish st. opp. Reservoir				1			1	
17. St. Joseph Gill and Common Ex. W. H.			1				1	
18. St. Joseph at Waste Weir					1	1	2	
19. St. Joseph Bureau near Notre-Dame				1			1	
20. St. Joseph Ontario and St. Denis					1	1	2	
21. St. Joseph Ontario and Champlain					1	1	2	
22. St. Joseph Papineau Square					1	1	2	
23. St. Joseph Phillip Square				1			1	
24. St. Joseph do and St. Catherine						1	1	
25. St. Joseph Place d'Armes	2	1					5	
26. St. Joseph Prince and Common				1		1	2	
27. St. Joseph Richmond Square		2		1			3	
28. St. Joseph Seigneurs and Basin				1		1	2	
29. St. Joseph Sherbrooke and Drummond					1	1	1	
30. St. Joseph Sherbrooke and Guy					1	1	1	
31. St. Joseph Ste. Ann's Market					4		2	
32. St. Joseph St. Antoine Market				1		1	2	
33. St. Joseph St. Catharine and Papineau Road					1	1	2	
34. St. Joseph St. Gabriel Market					1	1	2	
35. St. Joseph Notre-Dame near Suzanne				1		1	2	
36. St. Joseph St. Thomas and Ottawa					1	1	2	
37. St. Joseph Victoria Sq., south of Craig		1	2				3	
38. St. Joseph do north of Craig	3						4	
39. St. Joseph Viger, Sq., Basin No. 1		1					1	
40. St. Joseph do do No. 2	3						4	
41. St. Joseph do		1					1	
42. St. Joseph Viger Market					2	6	6	
43. St. Joseph Wellington and St. Patrick					1	1	2	
44. St. Joseph Kennedy, opp. Flour Sheds				1		1	2	
Total	11	7	7	16	20	32	93	

Removed fall of 1881.

Removed summer of 1881.

SCHEDULE No. 12.—*Continued.*

No	LOCALITY. At Exhibition Grounds,	Cast Iron Basins, Wood Fountains, Cattle Water Troughs,			Number of Jets.
1	Opposite Crystal Palace	1			17
2	At Horse Ring.....				2
3	Distributed over grounds			12	12
4	For Ice Water.....		2		8
5	St. Urbain str. and Mount Royal Avenue.....				1
6	Bleury street and Mount Royal Avenue.....			1	1
7	Opposite Agricultural Buildings.....		1		1
8	Distributed over grounds for fire purposes			1	4

No	LOCALITY.	Iron Fountains, Wood Fountains, Cattle Water Troughs, Urinals.				Number of Jets.
1	Wind Mill Point.....	1	1	1	3	
2	Allan's Wharf.....	1		1	2	
3	Allan's Sheds.....		1		2	
4	Opposite Custom House.....			1	1	
5	King's Basin	1			1	
6	Dominion Line.....		1	1	3	
7	Foot of Jacques-Cartier Square.....	1			1	
8	Beaver Line.....		1	1	3	
9	Donaldson Line.....			1	1	
10	Longueuil Ferry.....			1	1	
21	Foot of Marlboro street.....			1	1	

ADMINISTRATION.

STATEMENT showing the various details of the expenditure
of the Montreal Water Works Department for the civic year
ending December 31st 1884.

ADMINISTRATION— \$ cts. \$ cts. \$ cts.

AQUEDUCT.

and repairing fences.....	257	97	
along bridge approaches,			
repairing bridges, &c.....	218	27	
ditches \$1.25. Repairing			
excavations and earth work	374	02	
at settling pond, masonry..	638	88	
house at entrance and tak-			
ings	148	66	
recoeds.	101	28	
and salary.	600	00	
	62	47	
			2401 55

WHEEL HOUSE.

by, Chief Engineer.....	1600	00	
asst. do	700	00	
do	700	00	
and Lecours, oilers	880	85	
machinery.	696	00	
painting.....	25	60	
buildings.....	791	00	
round buildings.....	128	49	
coping and railing in front			
building on Tail Race side....	722	00	
.....	143	62	
oils, tallow, &c	1170	92	
			7558 48

Carried over..... 9960 03

Brought over..... \$996

ENGINE HOUSE.

Repairs to Worthington engine.....	318 95	
“ buildings, coal shed and boilers.....	719 00	
Coal for steam.....	6042 27	
Wages.....	2750 18	
Rent for land for 1983-84.....	100 00	
Sundries.....	10 75	
Veary, engineer	1000 00	
Supplies, oils, tallows, &c	264 31	
	<hr/>	11205 46

TAIL RACE.

Repairs to fences and bridges.....	194 16	
	<hr/>	194 16

PIPE TRACK.

Repairs to valve chambers.....	135 43	
Filling up a slope on Atwater Avenue.....	336 00	
	<hr/>	471 43

RESERVOIRS.

Guardian's salary.....	800 00	
McTavish reservoir ; repairs.....	672 09	
High level “ “	279 56	
Care taker, high level reservoir 1883.....	100 00	
Shovelling snow	39 99	
Fuel and light	107 42	
Sundries.....	58 25	
	<hr/>	2057 31

HYDRANTS.

Inspecting, wages.....	3497 34	
Repairing, “ and materials.....	1467 53	
Thawing, horses and laborers	451 79	
	<hr/>	5416 66

PUBLIC FOUNTAINS.

Repairs, wages.....	535 65	
“ materials	315 54	
	<hr/>	851 19
	<hr/>	20
Carried over.....		30

Brought over....

30156 24

DISTRIBUTION PIPES.

Repairs to mains, services and valves,	
wages	1464 74
Thawing pipes and carting water.....	480 08
Inspecting service pipes inside houses.	1945 88
Repairs to footpaths and service boxes,	
wages	1414 07
Materials, iron, casting, lead, tin, &c..	197 59
" wood, planks, nails, &c....	936 81
" bricks, cement, sand, &c...	138 72
" New meters.....	2822 44
	<hr/>
	15400 00

WORK SHOP ON LAGAUCHETIERE ST.

Wages, foreman, clerk, turncocks, me-	
chanics, laborers, carters and night	
watchman	6285 34
Iron, spikes, nails, tin, lead, &c.....	60 75
Timber, wood, coal oil, lamps, &c....	105 46
Tools, pails, drinking cups, &c.. .	389 81
Rent of foreman's house.	185 00
Telephone and connections with Police	
stations and City Exchange.....	229 90
Fuel and light	565 53
Sundries	113 16
	<hr/>
	7934 95

WORK SHOP AT WHEEL HOUSE.

Wages, 4 mechanics.....	228 19
Materials, iron, copper, lead, &c.....	17 61
Sundries, including \$317.46 for new	
meters, transferred from P. L...	378 39
	<hr/>
	624 19

METER DEPARTMENT.

Two meter inspectors	1593 75
Sundries for inspection.....	17 90
Testing, placing and repairing meters.	1885 48
Materials	168 60
	<hr/>
	3665 73
	<hr/>
	27624 87
Carried over.	57781 11

Brought over

57781

ENGINE HOUSE AT McTAVISH ST.

One stoker \$530.00 and an assistant engineer \$530.00.....	1091 19	
Fuel and light.....	1675 16	
Oils, tallow, &c	34 37	
Repairs to building and machinery....	94 04	
Sundries.....	88 59	
	<hr/>	2983 35

MISCELLANEOUS.

Contingencies for office, drawing paper instruments, ink, &c.	347 25	
Postage stamps, carters, sundries.....	142 05	
Horse keep, superintendent	600 00	
Map for distribution pipes, draughts- man and sundries	729 00	
Damages	284 10	
School taxes and assessment outside municipalities.....	6193 53	
Subscriptions to Gazette and Herald..	26 75	
	<hr/>	8322 68
Water to exhibition grounds.....	324 69	

STAFF.

Superintendent.....	3500 00	
Assistant superintendent.....	2000 00	
Clerk	1000 00	
Junior clerk.....	500 00	7000 00
	<hr/>	1863

LOANS.

PIPE LAYING.

Wages	13536 24	
Tin, lead, zinc	2829 56	
Repairs to footpaths at canal.....	87 03	
Copper	2254 10	
Timber.....	202 13	
Bricks	205 60	
Drain pipes, cement, lime, &c	230 58	
Special castings	2401 58	
Cast iron pipes.....	1791 88	
Iron, iron pipes	665 73	
Tools	76 61	
Packing.....	39 92	
Sundries.....	856 87	
Valve stones	315 00	2549
	<hr/>	

10190

222

7641

St. Constant.	618	648	2	12	281	12	11
Albina	504	504	2	8	208	8	4
Drolet	81	81		8	248	8	4
Charlotte							
St. Lawrence							
Roy					64	6	3
Cadioux					43	1	1
Craig					54	2	1
St. Elizabeth					54	1	1
Laval Avenue					42	2	2
Total	1260	234	3	82	1993	65	20
<i>St. James Ward.</i>							
Montcalm							
Berli					228	12	7
Burelay					400	13	8
Jacques Cartier			1	1	17	1	1
Amherst					141	6	3
Beaudry					55	3	3
Ontario					68	4	3
St. André					71	2	1
Craig					329	13	7
Mignonne					31	1	1
Campau					72	8	8
St. Christophe					34	2	1
St. Catherine	72	72			241	9	6
Visitation					62	4	4
St. Hubert					101	2	2
Laguchetière					103	3	2
Cherrier	684	684	1		7	7	6
Dorchester					285	5	4
Brock					147	6	3
Total	684	72	1	2	22	2	2
		756			2510	103	77
							30

INVENTORY.—Continued.

New hydrants.....	15	Hydrants already used	29
Hydrant castings, incomplete.	20	Drinking troughs for cattle...	2
Cast iron fender posts.....	28	Street watering nozzles (brass) 443	
Hydrant covers, assorted.....	70	do do do (iron) .	396
Pieces for lengthening hydrants.....	92	Hydrant nozzles.....	43
Hydrant Sleeves (Setts).....	3	Assorted spindles.....	74
		Rods for stop-cocks (assorted)	134
<hr/>			
2' Brass cocks for iron pipes..	6	2" Iron pipes (in feet).....	76
1½" " " " "	7	1½" " " "	316
1" " " " "	11	1" " " lengths 136 in Ft.	2108
1½" Pneumatic cocks.....	1	1½" Lead pipes in lbs.....	337
1" " " " "	19	1" " " "	36960
1" Coupling cocks ..	97	½" " " "	4249
½" " " "	9	¼" " " "	580
¾" " " "	39		
3 Way cocks	45	197 bars pig lead, weight	24625 lbs
1" Nozzles.....	16	Block tin " "	840 lbs.
½" "	60		
¾" "	478	1/16 Brass tubing " "	372 lbs.
1' Unions	275	4" Iron boxes.....	13
½" "	550	1½" " "	20
1" "	248		
¾" Y's "	153		
1" Y's "	18		
¾" Crosses.	111	Valve stones	24
1" T's.....	128	Single service stones.....	6
1" x ½" T's	87		
Assorted caps for boxes	143		

No. 15.—SCHEDULE showing the number of Assessed Dwellings, Stores, Shops, Offices, Warehouses, Manufactories, Hotels, &c., in the City of Montreal, for the year 1884-85, with the Assessed Water Rates thereon.

D WELLINGS.

Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
3087	3063	24	\$5.00	27382	27255	127	.....
3939	3924	15	5.75	114	114	....	\$29.75
4160	4439	21	6.50	9	8	1	30.50
3681	3671	10	7.25	42	42	....	31.25
2177	2170	7	8.00	213	213	....	32.75
1740	1730	10	8.75	25	25	....	34.25
761	759	2	9.50	2	2	....	35.00
1677	1657	20	10.25	6	6	....	35.75
262	262	....	11.00	79	79	....	36.50
1025	1022	3	11.75	13	13	....	37.25
191	191	....	12.50	1	1	....	38.00
695	695	....	13.25	3	3	....	38.75
362	354	8	14.00	....	....	....	39.50
513	510	3	14.75	145	145	....	40.25
94	94	....	15.50	4	4	....	41.75
406	405	1	16.25	7	7	....	43.25
12	12	....	17.00	39	39	....	44.00
491	490	1	17.75	77	76	1	44.75
35	35	....	18.50	29	20	....	51.50
204	204	....	19.25	63	63	....	55.25
12	12	....	20.00	2	2	....	56.75
326	326	....	20.75	1	1	....	58.00
98	96	2	21.50	1	1	....	58.25
232	232	....	22.25	10	10	....	59.00
34	34	....	23.00	57	57	....	62.75
165	165	....	23.75	1	1	....	66.50
1	1	....	24.50	15	15	....	70.25
361	361	....	25.25	25	25	....	77.75
6	6	....	26.00	3	3	....	85.25
156	156	....	26.75	7	7	....	92.75
7	7	....	27.50	1	1	....	100.25
113	113	....	28.25	4	4	....	107.75
59	59	....	29.00	3	3	....	122.75
				2	2	....	152.75
7382	27255	127		28366	28237	129	

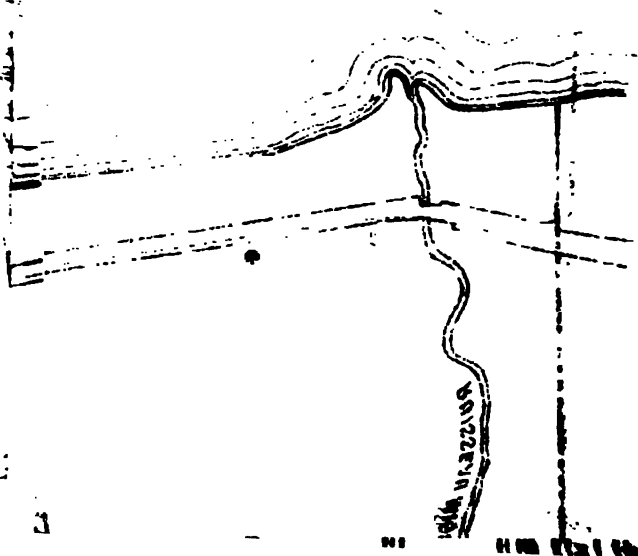
SCHEDULE showing the Pipes, etc., laid down.—Continued.

RECAPITULATION

NAMES OF WARDS.	Length in feet of Cast Iron Pipes.				Total.	Numbre of Valves.					Total.	Hydrants.	Houses supplied.	Length of Lead Pipes in feet.	Brass Stop Cocks.	Pneumatic Cocks.	
	Length in feet of Cast Iron Pipes.					Numbre of Valves.											Total.
	12 in.	10 in.	6 in.	4 in.		12 in.	10 in.	6 in.	4 in.	3 in.							
East.....	104	142	246	....	....	2	2	....	4	....	17	518	14	2	
Centre.....	137	18	155	....	....	3	....	....	3	....	3	45	2	1	
West.....	423	....	....	423	....	2	....	....	....	2	....	9	240	9	2	
St. Ann's.....	286	24	....	310	....	....	1	....	....	1	....	30	650	25	12	
St. Antoine.....	3	....	300	1109	1412	1	1	1	....	....	3	2	148	4718	128	47
St. Lawrence.....	2070	297	2367	....	....	8	2	....	10	....	46	879	43	24	
St. Louis.....	1260	234	1494	....	....	3	....	....	3	....	82	1993	65	26	
St. James.....	684	72	756	....	....	1	1	....	2	....	103	2510	77	30	
St. Mary's.....	450	248	698	....	....	2	....	....	2	1	125	2594	91	35	
Hochelaga.....	171	1395	1566	....	....	....	4	1	5	3	87	2363	55	3	
Grand Total.....	3	709	5290	3515	9427	1	3	21	9	1	35	6	550	16510	509	182	

SECRET

WYCK
LIBRARY
TIL
DENOX
FOUNDATIONS



No. 11.—SCHEDULE showing the average pressure in the City Mains during the year 1884.

MONTHS.	At W. Works Shop corner of St. Charles Boulevard, Baltimore.										
	Central Fire Station Craig street.	Fire Station No. 2, St. Gabriel street.	Fire Station No. 3, Wellington st.	Fire Station No. 4, Chadwell Sq.	Fire Station No. 5, St. Catherine st.	Fire Station No. 6, Ontario street.	Fire Station No. 7, Dalhousie Sq.	Fire Station No. 8, Craig street.	Fire Station No. 9, Centre Street.	Fire Station No. 10, St. Catherine st.	Fire Station No. 11, Ontario street.
1881											
January	65 00	75 00	75 00	75 00	45 00	60 00	72 00	70 00	30 00	65 00	65 00
February	65 00	75 00	75 00	75 00	45 00	60 00	72 00	70 00	30 00	65 00	65 00
March	65 00	75 00	75 00	75 00	45 00	60 00	72 00	70 00	30 00	65 00	65 00
April	65 00	75 00	75 00	75 00	48 00	60 00	72 00	70 00	30 00	65 00	65 00
May	65 00	75 00	75 00	75 00	50 00	60 00	72 00	70 00	30 00	65 00	65 00
June	65 00	75 00	75 00	75 00	50 00	60 00	72 00	70 00	30 00	65 00	65 00
July	65 00	75 00	75 00	75 00	50 00	60 00	72 00	70 00	30 00	65 00	65 00
August	65 00	75 00	75 00	75 00	50 00	60 00	72 00	70 00	30 00	65 00	65 00
September	65 00	75 00	75 00	75 00	50 00	60 00	72 00	70 00	30 00	65 00	65 00
October	65 00	75 00	75 00	75 00	50 00	60 00	72 00	70 00	30 00	65 00	65 00
November	65 00	75 00	75 00	75 00	50 00	60 00	72 00	70 00	30 00	65 00	65 00
December	65 00	75 00	75 00	75 00	47 00	54 00	71 00	69 00	30 00	67 00	66 00
Average 1884	72 00	75 00	75 00	75 00	48 00	60 00	72 00	68 00	30 00	66 00	65 00
" 1883	72 00	75 00	75 00	75 00	50 00	60 00	72 00	69 00	30 00	64 00	66 00

SCHEDULE showing the number of Dwellings, &c.—(Continued.)

HOTELS AND TAVERNS.

Number assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
100	100	.....	\$12 00	360	360	.....
74	74	.....	17 00	3	3	.....	\$62.00
80	80	.....	22 00	5	5	.....	72.00
20	20	.....	27 00	1	1	.....	82.00
32	32	.....	32.00	2	2	.....	92.00
19	19	.....	37.00	3	3	.....	102.00
22	22	.....	42.00	1	1	.....	152.00
5	5	.....	47.00	1	1	.....	162.00
7	7	.....	52.00	1	1	.....	172.00
1	1	.....	57.00	1	1	.....	184.00
				1	1	.....	242.00
360	360	.....		379	379	.....

HORSES.		COWS.		STALLS.		URINALS.		WATER CLOSETS.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
4784	\$2.00	737	\$1.00	522	\$1.00	455	\$1.00	637	\$2.00
				475	2 00	42	1 50	344	3.00
						28	3.00	8637	4.00
						14	15.00	22	15 00
4784.		737		997		539		9640	

SPECIAL RATES.

BAKERIES.		BEER BOTTLEERS.		FOUNTAINS.		STEAM ENGINES.		Total.		SUNDRI	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Horse power.			No.	Rate.
13	\$5.00	9	\$5.00	3	\$3.00	1	1	1			
3	8.00	4	10.00	36	5.00	9	1	9		3	\$ 5.00
8	10.00	1	15.00	4	10.00	21	2	42			
4	12.00	1	24.00	1	12.00	11	3	83		1	6.00
11	15.00					10	4	40			
6	20.00					12	5	60		5	10.00
1	21.00					7	6	42			
1	25.00					4	7	28		3	15.00
2	30.00					7	8	56			
1	40.00					3	9	27		1	17.00
						4	10	40			
						4	12	48		1	20.00
						2	15	30		1	22.00
						1	18	18		1	24.00
						9	20	180		1	30.00
						2	30	60		3	35.00
						1	40	40		1	50.00
						1	45	45		1	600.00
						1	50	50		1	750.00
50		15		44		110		848		23	

SCHEDULE No. 12.—*Continued.*

No	LOCALITY. At Exhibition Grounds,	Cast Iron Basins.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.
1	Opposite Crystal Palace	1	.....	.....	17
2	At Horse Ring.....	.....	.....	.....	2
3	Distributed over grounds .....	.....	.....	12	12
4	For Ice Water.....	.....	2	.....	8
5	St. Urbain str. and Mount Royal Avenue.....	.....	.....	.....	1
6	Bleury street and Mount Royal Avenue.....	.....	.....	1	1
7	Opposite Agricultural Buildings.....	.....	1	.....	1
8	Distributed over grounds for fire purposes .....	.....	.....	1	4

No.	LOCALITY.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Urinals.	Number of Jets.
1	Wind Mill Point.....	.....	1	1	1	3
2	Allan's Wharf.....	1	.....	.....	1	2
3	Allan's Sheds.....	.....	.....	1	.....	2
4	Opposite Custom House.....	.....	.....	.....	1	1
5	King's Basin	1	.....	.....	.....	1
6	Dominion Line.....	.....	.....	1	1	3
7	Foot of Jacques-Cartier Square.....	1	.....	.....	.....	1
8	Beaver Line.....	.....	.....	1	1	3
9	Donaldson Line.....	.....	.....	.....	1	1
10	Longueuil Ferry.....	.....	.....	.....	1	1
21	Foot of Marlboro street.....	.....	.....	.....	1	1

ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

Montreal Water Works,

FOR THE

YEAR ENDING 31st DECEMBER 1885.

Printed by Order of the Water Committee



Montreal :

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1886



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Louis Lesage,

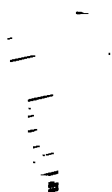
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ANNUAL REPORT
OF THE
SUPERINTENDENT OF THE MONTREAL WATER WORKS,
FOR THE
YEAR ENDING DECEMBER 31st, 1885.

—)o(—

To the

Mayor, Aldermen, and Citizens of the City of Montreal.

GENTLEMEN,

I beg to submit my annual report on the management of the City Water Works during the past year, together with certain remarks and suggestions which the existing condition of said works prompts me to offer, for the consideration of your honorable council.

The schedules appended show in tabular form the different operations of the year, viz :

No. 1 schedule showing the work of turbine wheel No. 1.

No. 2 schedule showing the work combined of breast wheel and of turbine wheels Nos. 2 and 3.

No. 3 schedule showing the work combined of steam engines Nos. 1, 2 and 3.

No. 4 schedule showing the work of high level service steam engine.

No. 5 schedule showing the depth of water, the rain fall and the mean monthly temperature at the Mc. Tavish Reservoir for the year 1885.

No. 6 schedule of repairs to mains, fire hydrants, valves and service pipes during the year 1885.

- No. 7 comparative table showing the average daily consumption of water for each month and for each year from 1876 to 1885.
- No. 8 schedule showing the different kinds and sizes of water meters in use in the city.
- No. 9 schedule showing the pipes, fire hydrants, valves, services, etc., laid in the city during the year 1885.
- No. 10 schedule showing a summary of the pipes, fire hydrants, valves, services, etc., laid in the city up to December 31st 1885.
- No. 11 schedule showing the average pressure in the city mains during the year 1885.
- No. 12 table showing the positions of public fountains erected in the city up to 31st December 1885.
- No. 13 statement showing the various details of the expenditure in the management of the Water Works Department for the civic year ending 31st December 1885.
- No. 14 inventory of stock on hand January 1886.
- No. 15 schedule showing the number of assessed dwellings, stores, shops, offices, warehouses, manufactories, hotels, etc., supplied with water from the department, for the year 1885, with the assessed value thereof.
- No. 16 cash receipts by the water department during the civic year ending 31st December 1885.

AQUEDUCT.

The repairs done on the Aqueduct during the past year were as follows.

Eleven bridges jacked up and repaired. New approaches and planking to Caverhill's bridge. A few planks renewed in the flooring of the bridge at Entrance to Aqueduct. Four new stop logs at rock gates. The ordinary repairs to fences and approaches to bridges.

Berm ditches cleaned along the Inland Cut. Weeds cut along the whole line of Aqueduct. All the bridges and gates were painted. The break in the road across the swamp on Dumberry's farm, just north of the new Regulating Gates was repaired, and some cuts made by surface water, in the banks of the Inland Cut, were refilled.

During the freshet of last spring, a leak caused by frost, was discovered in the bank of the Aqueduct, round the back of the S E abutment of the regulating gates bridge, near the junction of the Inland Cut with the old Aqueduct. This leak caused some alarm at first, but was fortunately stopped before serious damage had been done. It necessitated however the expenditure of a considerable sum later in the season, to make more substantial and permanent repairs than were possible whilst the high water continued. What augmented this expenditure beyond the amount anticipated, was the fact that the entrance gates, intended for shutting off the water from the Aqueduct in such an emergency as this, were found to be all but useless. The cost of raising and getting them into position, was very great on account of their twisted and leaky state and for the same reasons and owing to their poor construction, when in position they were only partially effective in closing off the water.

It was late in September last that these gates were found to be in such condition that it would be unsafe to depend upon them, and that they could not be repaired at any reasonable cost. I therefore recommended to the water committee that new ones should be procured and your council made an appropriation of \$12,603 for that purpose. Tenders have been called for and a contract for the work will probably be given out in a few days.

The following repairs are also necessary, viz: Desmarchais' bridge to be renewed. Brault's bridge a new beam. Some of the other bridges require to be jacked up and braced. New planking for Entrance Bridge. The gates along the line of old Aqueduct must be renewed and

some of them require new gate posts. The ordinary repairs to be done will be necessary also cleaning of ditches on Hamilton and on the Agitation lines of Crawford's Greenhouse's, Greenhouse's, Greenhouse's and Mann's farms. Some repairs to some of the Agitation will also be wanted where they have been worn by the action of surface water.

WHEEL HOUSE AND PUMPING WORKS.

All requisite repairs to the pumping machinery and buildings were done during the year. A detailed account of water repairs will be found in the appended report of Mr. Keating, engineer in charge of these works.

Although the water power machinery is in fair working order it must not be forgotten that a portion of this machinery, viz that pertaining to the old breast wheels and their pumps is pretty well used up and it is only by constant attendance and care that it can be kept efficient. We must soon look for a complete renewal and be prepared for any emergency of the kind. This is one of the reasons which prompted the addition of another steam engine during last year.

The total quantity of water pumped by water power during the year is 8,618,855,004 gallons with an expenditure of \$20,571.10 as shown in schedule No. 13 under head "Wheel House" making \$17.165 per million gallons raised 160 feet high or \$0.0102 per foot high.

The total quantity of water pumped by steam power during the same period is 849,499,942 gallons at an expenditure of \$13,691.46 or \$15.8273 per million gallons raised 160 feet high or \$0.009365 per foot high.

The following table shows the cost of raising 1 million gallons 1 foot high, by water and by steam for the last eleven years and the average cost by each method for that period.

Year.	By water.	By steam.
1875	\$0 0200	\$0.119
1876	0.0140	0.144
1877	0.0158	0.080
1878	0.0106	0.170
1879	0.0093	0.119
1880	0.0120	0.123
1881	0.0136	0.121
1882	0.0118	0.258
1883	0 0135	0.134
1884	0.0124	0.211
1885	0.0102	0.094
Average of 11 years.....	0.0130.....	0.143

The machine shop at the wheel house has maintained its efficiency as usual. The following list shows the new work turned out there.

- 24 fire hydrants.
- 18 six inch valves.
- 30 four inch valves.
- 17 four inch valve spindles.
- 6 six inch “
- 30 $\frac{3}{8}$ cramps for moulding boxes.
- 72 one inch iron bolts.
- 647 iron service rods.
- 1278 one inch brass service caps.
- 55 one and $\frac{1}{2}$ inch “ “
- 4 iron ratchet braces.
- 1 cast iron flange planed.
- 76— $\frac{3}{8}$ inch meter brass couplings.
- 36— $\frac{3}{8}$ “ “ nuts.
- 24— $\frac{1}{2}$ “ “ couplings.
- 24— $\frac{1}{2}$ “ “ elbow couplings.
- 172 meter brass pistons turned.
- 538 one inch malleable iron caps tapped.
- 1073 brass caps.
- 1138 “ couplings.

55-1 brass return tank connections

314 - 1 iron -

15 - 1 inch brass waterstop nipples

44 brass caps for vacuum tubes turned and fitted.

44 lead weights fitted in same.

2 pump pistons cylinder engine turned and
fitted

2 bearings in same.

17-1 inch iron water tank

17-1 - - - -

4 new brass air pumps

1 new grade for pipe cutting machine.

3 new iron screws for cutting machine.

1 - - - - - hanger

6 iron flanges faced and drilled

4-1 inch brass nipples

2 pieces brass for meters.

2 4 inch meter pipes iron faced and drilled.

313-1 inch pressure brass cocks

50-1 - - - -

4-1 - - - -

77-1 inch brass couplings

155-1 - - - - stop cocks

124-1 - - - -

115-1 - 3 way -

323-1 - brass pipes

13-1 - - - -

116-1 1 1/2 inch 3 way brass branches

126-1 1 1/2 - - - brass reducing couplings.

14-2 inch brass stop cocks for iron pipe.

15-1 1/2 - - - -

12-1 - - - -

255-4 inch iron pins for fences.

1 pair hinges for gate.

1 crown meter cover faced and drilled.

1 g.b for air pump cross head engine No. 3.

3—1 inch nozles bored.

1—3 inch gem meter casing turned bored and drilled.

1 crown meter cover faced and drilled.

Besides which there were 69 meters repaired.

2 flanging machines, 2 hydrants.

24 hydrant rods, valves, drilling machines, etc.

Delivered from the brass foundry 7521 lbs of brass castings.

TAIL RACE.

The flood of last spring which was greater than usual caused considerable damage to the banks and fences of the tail race and necessitated considerable repairs. The embankments particularly have suffered a good deal of erosion which has weakened them. The approach on the north east end of the iron bridge which belongs to the Canadian Pacific R'y- Co., (and which cuts the bank of the Tail Race nearly three feet below its normal level) was washed away during the flood and allowed the water to escape into the adjoining fields, causing much damage. This approach was repaired by the R'y Company so far as the level of the bridge would permit, but as the bridge is too low, means will have to be adopted to raise it as high as the adjacent banks of the Tail Race. This can be done by the intervention of the county council of Hochelaga as the bridge is situated in, and unites the two municipalities of Verdun and St. Gabriel, both in the said county of Hochelaga.

Considerable repairs will also be required to be done to a large portion of the embankment and to the bridge crossing the Tail Race at the Lower Lachine Road.

PUMPING MAINS.

The principal work done to the pumping mains was the laying of a 30 inch embranchment from the engine-house to join the previously existing 30 inch main beyond

the Grand Trunk Railway and the River St. Pierre. This was required for the new Worthington Engine now in process of construction. A tunnel to carry the 30 inch main under the Railway had to be built, at considerable cost. This with the unexpected difficulties encountered in crossing the River St Pierre, at a season very unfavorable for such operations (floods having caused several interruptions) made the whole job a very expensive one.

The usual cleaning of the stop gates, on the lines of pipes, has been done and no trouble has been experienced in this portion of the work, which is in good order.

RESERVOIRS.

All the repairs which were in contemplation for the McTavish Reservoir, were done with the exception of the valve house flooring which was left over for this year. The reservoir is in good order. The normal level of the water has been maintained.

The High Level Reservoir at the head of Peel street has also been kept in good order and full.

Very little need be spent on these reservoirs this year to keep them in efficient condition. What may be required are painting the wooden fences, pointing some joints in the walls, replacing a few slates in the roof and a coat of paint to the cornice of the guardian's dwelling.

HIGH LEVEL SERVICE.

The Worthington pumping engine, the only engine for this service, has been kept in good repair and has, tho' of a capacity of only $\frac{1}{2}$ a million gallons per 24 hours, done all the pumping required. The few repairs done were, 8 spring valves in pump, renewed and 3 new rubber valves. A new set of grate bars to the furnace of the boiler were also put in.

The time is approaching when the pumping power for this service will have to be increased as the new St. Jean Baptiste ward, on account of its elevated position, must be supplied from the high level service.

The chimney stalk which at the beginning of the season showed some deterioration in the brick work and for repairs to which a small sum had been granted, proved to be so far gone that as soon as an attempt was made to repair it, it was found necessary to take it all down and rebuild it. This entailed the expenditure of as much more as had been granted for repairs.

As the addition above mentioned to the pumping power, may be delayed for another year, it will be necessary to replace two valve rods in the engine and one or two tubes in the boiler and to repair the roof of the coal shed.

Schedule No. 4 shows the work done by the engine, viz: 40,986,086 gallons pumped 213 feet high in 3,142 hours at a cost of \$3,279.25 making \$80 008 per million of gallons raised or \$0.376 per million gallons raised one foot high.

The cost of raising 1 million gallons 1 foot high was :

In 1876	\$0.240
" 1877	0.253
" 1878	0.355
" 1879	0.283
" 1880	0.274
" 1881	0.226
" 1882	0.256
" 1883	0.286
" 1884	0.318
" 1885	0.376
Average of 10 years	0.287

PIPE LAYING.

The total length of cast iron pipes laid during the year was 7,408 feet, viz :

4,245 feet of 6 inch and 3,163 of 4 inch ; 39 valves : 13 of 6 inch, 25 of 4 inch and 1 of 3 inch. 12 fire hydrants were laid.

There were 742 houses supplied with water, out of which 351 are through pneumatic stop cocks.

34 feet of 6 inch pipe, 310 feet of 4 pipe, one 6 inch valve and eight 4 inch valves were laid for private parties.

These, added to the amount laid up to 31st December 1884, make the totals to Dec. 31st 1885. 28,123 lineal feet of 30 inch cast iron pipe, 32,918 of 24 inch, 2,694 of 16 inch, 38,281 of 12 inch, 75,069 of 10 inch. 6,850 of 8 inch, 201,411 of 6 inch, 847,356 of 4 inch, and 2,095 of 3 inch cast iron pipe and 12,700 feet of smaller mains, making a grand total of 742,497 lineal feet, or 140 $\frac{1}{2}$ miles of main pipe.

There are 10 valves of 30 inch, 29 of 24 inch, 4 of 16 inch, 55 of 12 inch, 84 of 10 inch, 10 of 8 inch, 275 of 6 inch, 624 of 4 inch, and 29 of 3 inch, making a total of 1,180 stop valves.

There are 955 fire hydrants including 52 private ones.

The number of houses supplied with water is 28,869.

MAINTAINANCE OF DISTRIBUTION PIPES, SERVICE PIPES, HYDRANTS AND PUBLIC FOUNTAINS.

A great deal of trouble and expense was incurred during last winter (on account of its unusual severity) in the endeavour to protect the service pipes and hydrants from frost. In many places the frost penetrated beyond the depth at which we generally lay pipes, and many which, tho' laid too high, had hitherto escaped freezing, did not escape last winter, demonstrating the necessity of adhering to a depth of at least 6 feet. Notes of these cases have been made and the remedy will be applied as occasion offers.

As to the maintainance, improvements and connections to be made to the system of pipes, valves, hydrants and service pipes, a perusal of the report of Mr. Lagacé, foreman, which is hereto annexed, will give all

required information, Many of his recommendations I propose carrying out during next summer, as well as to lay a ten inch pipe in Commissioners street, from Jacques Cartier to Bonsecours street, to replace the six inch which was removed from that street during the construction of the depot of the Canadian Pacific Railway Company, so as to afford more protection to the large buildings erected in the yard of that Company.

CONSUMPTION OF WATER.

The total amount of water pumped during the year is 4,369,234,046 gallons, making a daily average as shown by schedule No. 7, of 11,900,504, that is an increase of 1,333,467 gallons over the daily average of 1884.

Of the above amount, 312,898,155 gallons have been metered and charged for at meter rates, 301,593,515 gallons used in the city, and the balance 11,304,640 gallons supplied to outside municipalities.

For flooding rinks and slides, filling boilers, tanks, etc., 247,158 gallons were used. 1,839,600 gallons for fires, 32,722,433 for watering streets, and 13,014,000 for public fountains. For the fountains and latrines on the wharfs 7,909,396 gallons and for lubricating the steps of the turbine wheels at the pumping works 22,760,114 gallons.

For the civic hospitals, 1,916,000 gallons. The balance ~~*3,035,339,452~~ gallons is that part of the city's consumption which is paid for at rates based on assessed rental and includes waste.

GENERAL REMARKS ON THE DISTRIBUTION MAINS IN REFERENCE TO FIRE SERVICE.

The great increase of late years in the number of large and high buildings, especially in the old wards of the city, has rendered the necessity of using steam fire engines for their protection, more and more apparent and

*3,975,927,190

[illegible]

... ..

the 1990s, the number of people in the world who are illiterate has increased from 1.2 billion to 1.5 billion. The number of illiterate people in the world is expected to reach 1.7 billion by the year 2015. The number of illiterate people in the world is expected to reach 1.7 billion by the year 2015. The number of illiterate people in the world is expected to reach 1.7 billion by the year 2015.

ADMINISTRATION.

As will be seen by schedule No. 13, the total cost of administration for 1885 was \$83,281.31.

Although the appropriation at the beginning of the year was only \$76,000.00, it was found that this amount had to be increased to the sum of \$84,283.66 in order to meet some unforeseen expenditures principally caused by the flood of last spring and also by the necessity of purchasing an extra quantity of steam coal, in order to provide for this winter's pumping. Up to '85 the coal usually bought the previous year was found sufficient to carry on the work of the following season, but last winter it was found not likely to be so. Consequently when the season for buying coal (which is during summer) came, it was deemed prudent to buy enough to last for this winter. Although properly speaking, this expenditure belongs to the year in which the coal is consumed, it is necessary in order to profit by the proper season for making the purchase, that this item should be provided a year in advance.

As the consumption of water is all the time increasing, more coal must be provided in this way and this increase in the quantity of coal required will continue until the new Aqueduct is completed.

WATER SUPPLY TO THE HOCHELAGA AND ST. JEAN BAPTISTE WARDS.

The 30 inch main of Sherbrooke street has its Eastern termination at Delormier avenue down which avenue there is a 24 inch to Notre Dame street. It will be necessary to lay a 24 inch main on Ontario street Eastward from Delormier avenue as far as Desery street, in Hochelaga ward, so as to improve the protection from fire in that ward, which has now become important by the establishment of considerable manufactories within its

limits and which at present depends for its water supply solely on a ten inch main in Notre Dame street. This ten inch main would be much relieved by the 24 inch above proposed for Ontario street. Before this improvement can be carried out, it will be necessary to open and grade Ontario street from Iberville to Desery.

The St. Jean Baptiste ward which is partly supplied by the City Water Works will require a large expenditure to complete its distribution. The greater part of this ward being above the level of McTavish street Reservoir must be fed from the High Level Reservoir and to that end Pine avenue must be opened up, from McTavish Reservoir to St. Lawrence street so that the 12 inch main of Pine avenue may be continued from University to Mance, to connect there, with the portion already laid from thence to St. Urbain street. It will also necessitate, if not this year, at least next, the addition of a larger steam pumping engine at the McTavish street Reservoir to furnish the water required.

As most of this ward is on rock the pipes should be laid after and in the same excavation as the sewers.

A certain amount of 10, 6 and 4 inch pipes, with their necessary connections, stop valves and fire hydrants will also be required, an estimate of which I have already prepared so as to advertise as soon as possible for the pipes, that they may be imported early the coming summer.

NECESSITY FOR INCREASING THE WATER SUPPLY.

The supply of water to the City has been maintained to its full demand, notwithstanding the great increase in consumption, which has exceeded the average of 84 by upwards of $1\frac{1}{2}$ million gallons per day. This increase was such that during last winter it necessitated the use of the whole available pumping power to keep the City supplied. In view of this fact it became necessary to increase

the pumping power and it was decided to erect a new steam pumping apparatus. Accordingly, after inviting tenders from several parties, a contract was entered into on the 11th of August last with the Messrs. H. R. Worthington for a steam pumping engine of 10 million gallons capacity, to be completed and in working order by the 15th January last. The work however has not yet been completed and is not likely to be for a month to come. In the mean time, according to the terms of their contract, the contractors are held responsible for all damage that may result to the City from the delay. This new engine will only relieve the city for a short period, if judged from the rapid increase of population and extension of its limits which has taken place of late years. This system of working by expedients instead of the comprehensive one of a large aqueduct will have the effect of making the cost of the water supplied to the City, beyond the means of most of the citizens. The time has now come to put into execution the remaining portions of the works recommended by the water committee and adopted by the City Council on 15 September 1873, that is the completion of the New Aqueduct which would supplement the present water power now taxed to its fullest capacity, by an unlimited power taken from the Lachine Rapids.

In order to refresh the memories of some members of your council who belonged to that body at the time when the report of the water committee above alluded to was adopted by the Council, and also for the information of new members. I think it will be proper to embody in this report a copy of the above mentioned document.

THE WATER COMMITTEE respectfully report,—

That, on the 26th March last, the Superintendent of the Water Works, Mr. L. Lesage, submitted the accompanying Report, in which, after giving a summary sketch of our Water Works from their incipency up to this day, he suggests the improvements that he thinks

are necessary to make the works thoroughly efficient, and to place the supply of water to the city beyond the possibility of any risk or contingency, such as the city has been subject to of late years.

These improvements are :

1. To construct a canal of large dimensions, starting at the River St. Lawrence, above the Lachine Rapids, somewhere below Fraser's Hill, which will form a junction with and cross the present aqueduct at a point above 3,400 feet from its entrance, and will run parallel to it as far as the Wheel House, where it will discharge itself into a large subsiding reservoir. It is proposed to provide at the entrance of this new canal a large and deep still-water basin, by means of heavy embankments thrown into the river, and formed with the surplus earth excavations of the canal. The New Aqueduct, which will be 130 feet wide and 13 feet deep at medium low water, is divided into three sections.

The first section to commence at the entrance, and to extend as far as the junction with the present aqueduct, including, of course, the still-water basin above adverted to.

The second section, to be called the Rock Cut, as it goes nearly all through a solid ledge of rock, will extend from the junction to within a distance of about 9,400 feet following in a parallel line the south side of the present Aqueduct.

The third section will extend from end of second section to the subsiding reservoir at the Wheel House, a distance of about 11,700 feet, also on the south side of the Aqueduct.

The new subsiding reservoir at the Wheel House will cover on area of about eighty-eight acres, and will admit of any number of wheels, to be provided for as the wants of the city increase.

The New Aqueduct, it is estimated, will be capable, by itself, to give the city, in winter, thirty millions of gallons per twenty four hours; and in summer, the two together will give one hundred millions of gallons per twenty-four hours. The quantity obtained at present does not exceed eight millions in winter, with the aid of the steam-engines, and ten millions in summer.

As a few years must elapse before the New Aqueduct can be brought into operation, it is important that all possible avail be made of the water power now at our disposal. To that end, it is suggested to do away with the two Breast Wheels, and to replace them with Turbine Wheels, as being better adapted to variable heads of water, and offering much greater economy in the feeding power, and also to lower the present Turbine Wheel, so as to give additional head.

In order to utilize all the available fall of water at the Wheel House, it is proposed to improve the present Tail Race, by cutting a channel through the bank in rear of the dam, in a direct line to the river. It is further recommended to establish a large storage reservoir somewhere on the slope of the mountain, capable of containing a month's supply of water, and also a smaller reservoir at a much higher level, especially to supply the upper section of the city, above Sherbrooke Street. As a necessary consequence, the capacity of the pumping mains will have to be augmented, to convey the increased volume of water from the wheels. Three additional mains are therefore recommended—viz.; two of 30 inches, and one of 16 inches diameter (the latter in connection with the high level reservoir) besides a 6-inch main to distribute the water to tenants on the high-level section:

Plans and estimates accompany the report of the Superintendent, from which it appears that the whole cost of the proposed works will amount to the sum of \$3,682,972, distributed as follows :

See Appendix	
Total cost.....	\$479,558
Cost -	129,619
Cost -	612,457
	<hr/>
Adding Station and Wind House.....	\$1,631,326
Large Reservoir at the Reservoir.....	218,967
Under High-Level Reservoir.....	686,640
See Type.....	247,333
See Type.....	414,700
	<hr/>
See High-Level Station.....	\$142,500
See Low-Level Station.....	172,748
	<hr/>
	316,248
See Auxiliary Power.....	167,858
Wind House and Pumping Machinery.....	337,000
	<hr/>
Total.....	\$4,019,972

However as the cost of these works may appear, it is obvious, and every year's experience makes it more and more apparent, that the time has come when the question of a complete remodelling of our Water Works should be squarely looked into the face, with a view of placing them on such a productive and permanent footing as will

entirely relieve the fears and anxiety that exist in the public mind in reference to the supply of water. The various measures adopted by the Council during the few years past, is considerable cost to the city, whilst they have afforded temporary relief cannot be depended upon for the future. Besides the advantages of hydraulic power over steam power, in securing the supply into the city, we are great to be appreciated. The experience we have had of both these powers shows their relative cost to be per unit of gallons irrespective of interest or cost of construction. —

For Water Power.....	\$ 3 41
For Steam Power.....	25 00

This discrepancy will no doubt go on increasing year by year, in proportion as the price of fuel will rise, as it is likely to do. Everything therefore seems to confirm the opinion which your Committee entertain, that the Council should, without any further delay, adopt a comprehensive scheme, such as the one suggested, for improving and enlarging the water power, and for providing adequate means of storage for the increased supply, even though it was necessary to levy an additional tax for that purpose.

To accomplish that object, it will be necessary, of course, to obtain additional authority to borrow, the amount at present available for the Water Works out of the existing loan, being only \$900,000.

In the meantime, your Committee would recommend:—

1st. That the plan submitted by the Superintendent of a New Aqueduct and additional reservoir above referred to be approved of by the Council and adopted.

2nd. That authority be asked from the Legislature at its next session to borrow an additional sum of \$2,500,000 for the purpose of carrying out the said plan.

3rd. That, with the means now at the disposal of the Corporation for water works purposes, your Committee be authorized to proceed at once with the following works:—

DESCRIPTION OF WORK.

First section of New Aqueduct.....	\$479,850
New steam engine, as already reported upon.....	80,000
To acquire the land for the proposed storage reservoir.	100,000
To provide 30-inch rising main.....	.. 170,000
	<hr/>
	\$829,850

4th. That an appropriation of the said sum of \$829,850 be granted to your committee out of the Water Works

loan, to enable them to carry out the works above specified, and that they be authorized to give out the necessary contracts for such work. The whole, nevertheless, respectfully submitted.

(Signed,)

J. W. McGAUVREAN,
GEO. W. STEPHENS,
DANIEL MUNRO,
HENRY THOMAS.

COMMITTEE ROOM, CITY HALL, }
Montreal, 4th May, 1873. }

As can be seen many of the recommendations in this report have already been executed. There still remain the 2nd and 3rd sections of the New Aqueduct and the still-water basin at the wheel house to make, before the city can enjoy the full benefit of the Lachine Rapids project.

I therefore urge your Council to take without delay serious measures to bring this project to completion, before it is rendered nearly impracticable by the encroachment of public improvements which are now going on and which may before long, bar access to the City.

I have for some years past urged the completion of this work, desiring that the city might be forewarned of the consequences of postponing it too far. The necessity for a new steam-engine has already come upon us, whilst the beautiful and abundant water power of the Lachine Rapids might have been utilized had my first warning been acted on in time. I hope there will be no more delay, but that immediate steps will be taken to get the work done, before another steam engine is required.

(Signed)

LOUIS LESAGE,
Supt. of M. W. W.

Montreal, March 17th, 1886.

*Report of the Assistant-Superintendent of Water
Works, on Meters and House-service Inspection
for the year 1885.*

MONTREAL, March 16th, 1886.

LOUIS LESAGE, Esq.,
Supt. M. W. W.

SIR,

I beg to submit my report on the operations of the Meter and House service Inspection branches of the Water Department, for the year 1885.

MEIERS.

The number of Meters in use at the end of the year was 508 being 40 more than the previous year. 467 of these are the property of the City and 41 belong to private individuals or to companies,

There were 76 new places metered, and at 36 places which had been metered, the meters were discontinued. 80 places were metered merely by way of test or experiment and were not charged at meter rates. There were 83 changes of meters made, for different reasons, chiefly on account of the instruments having got out of order.

The number of meters damaged by frost during the past year, was 14, 11 of them owned by the City and 3 by water tenants. Of these, 4 belonging to the City and 2 to tenants, were totally destroyed. The cost of repairs and the value

of the meters destroyed (except in one instance) were charged to the tenants, they being by law) responsible for all damage to meters on their premises.

There were 26 new meters and some connections purchased, at a cost of \$2036.58. The meters purchased, were 3 Gems, 11 Crowns, 11 Worthingtons and 1 Empire.

In addition to the meters before mentioned as having been in use at the end of the year, there were 9 meters at the Harbour latrines and fountains, as a check on the consumption there, tho' no charge is made for the water. These meters were put in about the end of May and removed the latter part of November, when the water was turned off from the wharfs.

There are also four meters at Wheel House, 3 to measure water used at steps of turbines and 1 for water supplied to boilers.

The water sold by meters is distributed as follows, viz:

	Gallons.
Railways (including City Passenger).....	114,880,303
Factories and engines.....	60,236,717
Elevators (exclusive of those at Hotels & Rys.)	42,578,306
Breweries.....	27,396,624
Hotels.....	26,168,411
Schools, Convents, Colleges.....	12,257,756
Hospitals and Homes.....	4,592,744
Churches and Queen's Hall (for organs)....	3,110,533
Miscellaneous, as Photographers, Livery stables, Skating Rinks, Slides, Horse exchange, Restaurants, Dyers Florists, &c.....	10,372,121
Outside Municipalities... ..	11,304,640
Total	<u>312,898,155</u>

Comparison of meter rates, with rates based
on assessed rental.

The total quantity of water pumped was..... Gallons.
4,369,234,046

That bringing no direct revenue was :

Flooding private rinks, boilers, tanks, &c.....	247,158	
Fires.....	1,839,600	
Watering streets.....	32,722,433	
Public Fountains.....	13,014,000	
Harbour	7,909,396	
Lubricating steps of turbines.....	22,760,114	
Civic Hospitals.....	1,916,000	
	<hr/>	80,408,701
Balance producing revenue.....		4,288,825,345
That charged for by meter was....		312,898,155
Balance being that charged for at rates based on assessed rental, and including waste.....		<u>3,975,927.190</u>
The revenue from water for '85 is		\$443,897.58
That from metered water is :		
Water.....	\$55,292 45	
Rent of meters.....	2,945 92	
	<hr/>	<u>58,238.37</u>
Balance being revenue from rates based on rental.....		<u>385,659.21</u>
Total water from which revenue is derived..Gals.	4,288 825,345	
Total revenue from same.....	\$443,897.58	
being equal to $10\frac{3}{4}\%$ cts. per 1000 gallons.		
Total water sold at rates based on rental..Gals.	3,975,927,190	
Total revenue from same	\$385,659.21	
being equal to $9\frac{7}{8}$ cts. per 1000 gallons.		
Total water sold at meter rates	312,898,155	
Total revenue from same	\$58,238.37	
being equal to $18\frac{1}{8}$ cts. per 1000 gallons, showing the price realized per 1000 gallons, by meter rates, to be nearly double of that, at rates based on assessed rental.		

Last year the Chief Meter Inspector commenced a general inspection of the premises where meters are in use, the object being to detect any fraudulent connection of pipes, should such exist, as well as to get accurate information as to the purpose for which the metered water is used and what portion of the water service in each establishment is metered and what is not. There was not time to finish the inspection, but it will be continued to completion this year and the information thus obtained, will I believe be of value to the department, enabling it more readily to detect any attempt at fraud on the part of persons using meters.

The workshop where meters are repaired and tested is too small, inconveniently arranged and very much out of repair. The testing tank especially is in a bad condition, the lower part of it being quite out of shape. I desire to draw your attention to this matter, as it is of importance from the fact that the yearly increase in the use of meters, calls for increased facilities for testing and repairs.

The meters have been visited regularly once a month, the reading of each taken and recorded,

The number of prosecutions in the Recorder's Court, for violation of the by-law relating to meters, was only two during 1885.

HOUSE SERVICE INSPECTION.

This inspection has been kept up without intermission, throughout the year and tho' necessarily incomplete, on account of the limited staff of Inspectors employed, has resulted in finding the following fixtures out of repair and wasting water, viz :

Bib cocks.....	642
Urinal cocks.....	34
Ball do	521
Stop do	37
Closet do	137
Basin do	84
Closet valves.....	47
Pipes burst.	278

The estimated average waste per hour from each defective fitting was $7\frac{9}{10}$ gallons. Besides which there were 35 taps left open to prevent freezing, each wasting 15 gallons per hour, 15 taps open to flush drains, wasting 100 gallons per hour each, 127 cases of using water illegally for building purposes, 56 cases of using hand hose illegally, 15 using illegally for manufacturing purposes and 3 cases of hydrants being used illegally. There were also 127 instances of sound heard on service pipes as of leaks. These cases were nearly all rectified very shortly after having been discovered. In some instances tenants who were tardy about it were prosecuted and compelled to make the requisite repairs.

The number of prosecutions in connection with this branch of the department, was 31.

The people against whom these prosecutions have to be brought are mostly "respectable" persons, that is, far too respectable, in their own estimation, to be brought up before the Recorder, but yet, their respectability is not of that high order to deter them from wasting the City water or using it without paying for it, if they think they can do so, with a fair chance of escaping detection. When detected and served with a subpoena from the Recorder's Court, many of them give a great deal of trouble, by using every endeavour to induce the Department to discontinue the action.

If the public can be brought to understand and recognise as a fact, that a fraudulent use of water or willful waste of it, when discovered, will not be tolerated, and that every instance of either one or the other, as soon as detected, will inevitably be followed by prosecution and fine, a very appreciable advance will have been made towards checking the rapid increase shown of late years in the rate of consumption. But such a utopian state of things, however desirable, is hardly to be hoped for, since here as elsewhere, it has been, is and always will be the case, that friends in power bring impunity to offenders, making the law a dead letter.

Both the house service Inspectors and the meter Inspectors, have attended to their duties satisfactorily.

The business of receiving the reports of inspectors, sending out notices, keeping the office meter books, attending to prosecutions in the Recorder's Court and other duties in connection with the meter and service inspection, has increased considerably and is increasing. There is enough work, if properly done and not allowed to run into arrears, to occupy the attention of one man and as I have other duties to attend to, I beg to suggest the advisability of your appointing some person to take charge of the books and other matters incidental to the inspection. Should the suggestion meet your approval, the person to be appointed ought to be, one having some practical knowledge both of meters and the house inspection.

Your obedient servant,

B. D. McCONNELL,

Assistant Supt. M. W. W.

PUMPING WORKS, JANUARY 16th 1886.

LOUIS LESAGE, ESQR.,

Superintendent Montreal Water Works.

SIR,

My annual report for the year ending 31st December 1885, is respectfully presented.

No. 1 WHEEL HOUSE.

No repairs were done to this building. The wooden sheeting of the walls will require some repairs which is all that is necessary.

Nos. 2, 3 and 4 WHEEL HOUSE:

Received no repairs. The double windows are well worn out, and should be replaced. The platform covering of the head race entrance will have to be renewed.

WORK SHOP.

A new floor was laid in this building. The wooden platform on the west side spanning the waste weir will require some repairs.

BRASS FOUNDRY.

No repairs were done to this building, it is in good order.

THE GROUNDS.

The excavation for the 30" main and the removing of a portion of the old engine foundation to make room for the new engine, very much disturbed the grounds. A considerable portion of the surplus stuff remains to be re-

moved, therefore their putting in order will cause considerable out lay.

Age and last spring flood, demolished the footpath, and the principle approaches to the works, which should be re-placed next spring.

THE PLATFORM SCALES.

A new stone foundation, was built for the large Platform scales. Platform and sills were also renewed, and the roof graveled.

Nos. 1 and 2 ENGINE HOUSE.

No repairs were done to this building. The pulling down of the engine foundation necessarily disturbed the floor, as it rested on said foundation, the new foundation not providing accommodation for resting the floor, other means must be taken, and the new floor laid; and the building inside generally repaired, painted and varnished.

No 3 ENGINE HOUSE.

This building received no repairs, and does not require any.

BOILER HOUSE.

Underwent no repairs, and from all I can see at present, will not require any.

THE COAL SHED.

The repairs to this building, consist of the completion of its drainage, two 6in. tile drains being laid. The stone buttresses of the foundation still show signs of springing by the action of the frost, they will likely require some repairs.

THE DWELLINGS.

Are in good order, the sheds in rear will require some attention, as the wooden foundation sills, under the brick work are rotten. The walls present a tumble down appearance, a portion of which may fall in spring when the frost is leaving the ground.

No. 1 WHEEL.

The repairs to this wheel were very trifling consisting of the renewing of 14 cogs in the mortice wheel, and the better securing of 4 of the stay bolts in the valve chest. A full set of wooden cogs ought to be shaped out this year in order to have them on hand should they be required the present ones having run as long as any previous set. It may be necessary to readjust two of the valves and seats in the pump chests. The fork end brasses of the connecting rods are worn out and must be replaced.

No. 2 WHEEL.

This wheel having done duty for over thirty years, the upright and diagonal arms, are considerably worn in their sockets, it is difficult to keep the gibs and keys holding the same in position, and they are frequently replaced. The outward rim cracked in the early part of the year, and was repaired by means of a large wrought iron patch, on the outside securely fitted with tight fitting bolts, and gives no trouble since. One of the Crank shaft girders, holding down bolts broke and was replaced. Taking into consideration the age of this wheel and its connections, although at present doing full duty yet it must be admitted, that it is very liable to accident.

No. 3 WHEEL.

No repairs were done to this wheel worthy of mention. The pumps attached, are the same that belonged

to the old breast wheel, that was removed 11 years ago, they are thirty years old, and give a good deal of trouble, being considerably worn, they require a good deal of attention. They are difficult to get at owing to the heavy leakage through the foundation walls into the pump room, all the stop valve chambers and tunnels around the premises drain into this room, which water at times causes much delay in packing the pumps as it must be pumped out, before the men can work at them. Some steps will have to be taken to remedy this.

No. 4 WHEEL.

Is in good repair, from all I can see at present will not require much repairs during the year.

No. 2 ENGINE.

This engine, did considerable service last winter, when we were so seriously threatened with a water famine, owing to the failure of the hydraulic power caused by the blocking of the Aqueduct by ice. This engine received no attention since it stopped last spring, as it was expected that the proposed new engine would be ready to do duty if required. No. 2, can be made available in a short time if required.

No. 3 ENGINE.

This engine being the main source of the city supply in the winter, did a good deal of work and performed its duty well. The valve arrangement in the pumps was changed by substituting weights for that of springs, which has worked admirably since and will do away with considerable trouble and expense. When the new engine is in position and ready to perform its duty I purpose having the high pressure pistons of this engine overhauled, and the rings adjusted. Other repairs may be necessary as the

engine may have a good deal of work to do this winter. A new sett of rubber pump valves, will be necessary to have on hand, the present ones being considerably worn.

The feed pump connected with this engine, for feeding the boilers, was furnished with new pump plungers, the old ones being worn out. New neck bushes were fitted to the stuffing boxes of the steam and water ends, the pump is at present working well.

No. 1 BATTERY OR TUBULAR BOILERS.

These boilers underwent heavy repairs, in order that they might be able to carry high steam to suit the requirement of the new Worthington engine.

The old patches, over the fire were removed and replaced by steel plates with double riveted longitudinal seams. The steam drums were more securely stayed. The feed water arrangement, which discharged its water immediately over the fire, through perforated tubes, was altered and separated from the blow off pipes which hitherto were in common, and were operated as desired by means of three way cocks. The feed water now enters the boiler, three inches below the proper water level. The boilers are blown off through separated pipes for the purpose; crosby safty valves, and the necessary accommodations for their application, were put on each boiler, and the greater portion of the brick setting, furnaces, and fire bridges, were rebuilt. The boilers are now in as good repair, as boilers of their kind 17 years old can be put. The work was superintended by Mr. E. O. Champagne the city boiler inspector.

No. 2 BATTERY CORNISH BOILERS.

This battery was also considerably overhauled, to carry the required higher pressure of steam necessary for the proposed new Worthington Engine. The steam drums were more securely stayed, two 1½ in. longitudinal

round iron stays were put in each boiler. Four double angle iron stiffening rings $3\frac{1}{2} \times \frac{1}{2}$ in. were also put in each boiler, two on each flue. The feed water was carried upward and further in, and is discharged 3in. below the proper level by means of slotted tubes which answer for distributors. The blow off arrangement was also altered, cast iron elbows being fastened to the bottom of the boiler, passing through the draught flue.

These require the sharpest attention to keep the pipes from freezing and consequently bursting. The bursting of one of these pipes under steam might be very serious.

NO. 3 BATTERY CORNISH BOILERS.

This battery had no repairs. It was tested with the other batteries before mentioned and found to be in first class order

THE PORTABLE STEAM PUMP AND BOILER

Were tested and are at present in good order and doing duty.

In concluding I beg to tender you my sincere thanks, for the able assistance you so kindly rendered me in the discharge of my duty.

The whole respectfully submitted.

I have the honor to be Sir,

Your humble servant,

D. KEARNEY, Engr.

Pumping Work.

WATER WORKS SHOP, January 1886.

L. LESAGE Esq ,

Superintendent Montreal Water Works.

DEAR SIR,

I respectfully submit the report of the repairs done to main pipes, stop valves, hydrants and service pipes, during the year ending December 1885, also some of the repairs and improvements required next year which are as follows .

REPAIRS TO MAIN PIPES AND STOP VALVES.

There has been one break on 12" main on McGill street, one on 10" in Friponne street, eight on 6" and twenty six on four inch mains at different parts of the city. The principal cause of these breaks, was as usual the excavations made for drains across our main water pipes. There have been eleven joints blown out on the 12" mains, eighteen on the 10" thirteen on the 6" and sixteen on the 4" mains. In my last year's report I stated the cause of so many joints blowing out.

One 10" two 6" and three 4" valves were renewed, four 6" and four 4" valve spindles were also renewed. A good number of the 6" and 4" stop valves, need to be changed, as they are no longer able to stop water. Some of them I mentioned in my last year's report.

The 4" main on St. James street from Canning westwards to about half way between Fulford and Dominion streets should be laid ; also that part from about one hundred and fifty feet, west of Guy street then East to Lusignan street, connecting Guy, Richmond and St. Martin streets on the north side of St. James street, to it. I suggest that this work be done in dry weather, and the pipe laid, not

and that seven feet deep. Chatham, St. Martin, Guy, Versailles and Aqueduct streets 4" mains should be laid across the Grand Trunk Railway and connected to St. James street 10" or 4" mains.

A hydrant is required on the end of 4" pipe in Desri-
villes area. To clean the water in that pipe, it would also
be useful in case of fire. LeBoyer street pipe east of Jacques
Cartier Square should be extended and connected to last
named pipe. St. Hubert and Campeau streets should be
connected to Craig street 6" main: or the 4" now on Craig
should be extended from Jan Carter to St. Hubert street,
connecting Campeau and St. Hubert streets mains to it.
The same 4" main on Craig below Visitation should
not be extended and connected to Panet street 10" main.
Barnard street 4" main should be connected to Notre Dame
street and sunk deeper at St. Paul, as it is now only
two and a half feet deep at that spot. Stanley street
4" main should be connected to Ste. Catherine street 6"
main at a junction point near Burnside street. Burn-
side east of Stanley should be extended and connected to
The street main pipe. Whether street 6" main could be
extended to connect with 4" on St. Louis street. Evans
street 4" main should be connected to St. Ursula street 6" main.
Fisher street 4" main should be connected. Visitation street. Vine
street 4" or 6" main should be renewed and replaced
by 6" pipe from St. Louis to St. Lawrence street. I
strongly recommend the above mentioned improvements
as they are of great importance in giving circulation to
water which is at present stagnated in *dead ends*, the
sludge which is at present not being sufficient to purify the
water. Shepherd street 4" main should be replaced by a
new pipe not less than 6" in diameter from 10" on St.
Patrick street to Grand Trunk street. The 4" pipe
now in use and laid in St. Patrick to Centre street,
and another set in place of same size was laid from Grand
Trunk street towards Centre, but not connected at
Centre there are for them being safe for the locality. If

this improvement was carried out it would increase the pressure of water to hydrants, particularly those on Richardson and Manufacturer west of Shearer street which are now of very little use, when required for fire purposes. This improvement is also very important because when the water is shut on Wellington street, the whole locality is supplied only by 4" mains, except by way of the Grand Trunk yards, Sebastopol and Congregation streets 6" mains. We can easily understand the inconvenience this may cause.

HYDRANT REPAIRS.

One hundred and one hydrant valves were renewed, eight old hydrants were replaced by non-freezing hydrants three defective ones were replaced, eight hydrant rods were broken and repaired. The number of hydrants reported frozen was four hundred and fourteen, two thousand three hundred and fourteen times. I may here state that although those hydrants were reported by Inspectors as frozen, in most cases they could be used if required, and notwithstanding the severity of the winter in every case where required, they were found in good order, and the men of the Fire Department deserve special mention for their carefulness in working hydrants. Eleven non-freezing hydrants were put in making the total one hundred and eighty seven including Hochelaga ward. Non-freezing hydrants should be put in all places where most exposed to frost. There are thirteen inspectors in winter and five in summer. Annexed list states hydrants found frozen over ten times during the winter 1884, 1885.

REPAIRS TO SERVICES.

Three hundred and sixty services were found frozen in walls. This is generally caused by cold and unprotected cellars. One hundred and ninety-three were reported frozen inside houses. Two hundred and ninety wooden

service boxes were replaced by iron ones. Forty services were choked by sediment and other causes. Five hundred and sixty-three leaks on services were found and repaired. The causes of so many leaks are divers; but the most are due to the old age of these pipes. Thirty-eight services were broken over drains. Seventy-one couplings were found leaking. Seventeen three way branches were replaced by 3 way cocks. Sixty-six defective cocks were replaced by old kind. 23 pneumatic cocks were put in to replace the old kind. Our plumbers were called six hundred and seventy-nine times for frozen services during winter 1884-1885. During the year we laid for new services three hundred and fifty-six pneumatic-cocks. This stop-cock with some improvements which are already added, I have no doubt will be far superior to the old stop-cock, and will do away with the old boxes, which were always a nuisance and a cause of great expense.

One hundred and twenty-six services were found frozen in the streets. On St. Lawrence from Guilbault to city limits, sixteen services were frozen across to main pipe, which is on the east side. They are laid in the rock five feet deep and the frost was down to the rock although some were covered with boards and manure laid on top. Most of those were to supply dwellings on the west side, only three on the other side having frozen, as they were laid deeper and did not cross the drain. On St. Hyacinthe from Napoleon to limits, the main pipe is only three and a half feet deep and was frozen, as well as the services which are laid at the same depth. On Cadieux from Napoleon to limits six services froze. These services were laid five feet deep. To escape frost, the main and service pipes on all streets north of Roy, and between St. Lawrence and Lava, avenues, should be laid seven feet deep, or at least six and a half feet below surface. On St. James street west of Chatham, eight services froze, these were laid five feet deep which is the depth of the 10" main and the frost was down to six and a half feet. On Dorchester from St.

Matthew to Fort six services froze. The new 12" main was laid six and a half feet deep, but the services were left at their original depth, five feet. I recommend that they be sunk to the depth of the main as the frost went down five and a half feet. I only mention localities where several services were frozen, but in general the mains and service pipes were too shallow, more particularly so, those of St. James street, connected to the 10" main west of Chatham, Albert, Delisle, Workman, Fulford, Quesnel, Dominion and Osborne streets. As a general rule all mains and services should be laid at least six feet below the surface.

REPAIRS TO FOUNTAINS.

The Victoria Square stone drinking tap, on Craig street should be raised at least twelve inches and a new drain laid from it to gully at the corner of Beaver street. The basins in Victoria, Richmond and Viger Squares will require the usual repairs. The following cattle drinking troughs, require a drinking tap stand; Sherbrooke and Guy, Ontario and St. Denis, Ste. Catherine and Papineau, Mill and River side, Viger cattle market. The fountain in Court House square, will have to be taken apart to repair pipe now leaking.

The men under my charge with very few exceptions have faithfully and intelligently fulfilled their duties; I am very grateful to you for the valuable assistance and kindly advice you gave me in the discharge of my duties during the past year.

Respectfully submitted

Your obedient servant,

CHAS. LAGACÉ, foreman.

of hydrants frozen over ten times during winter 1884-85.

A		H	
	Times.		Times.
avenue.....	20	Hotel Dieu & St. Famille.....	26
& Fulford.....	26		
ect above St. Antoine.....	23		
B		L	
Burnside & Mansfield.....	12	Lagauchetière & Papineau Sq... 17	
Burnside & Peel.....	25	Lusignan.....	29
Basin & Richmond.....	18	Lagauchetière & St. Margaret... 24	
C		M	
Coursol & Canning.....		Way above St. Catherine.....	38
Chatham south of St. Antoine..		nonne & German ..	25
Common west of Port.....			
Charbonneau & St. Dominique			
Common & St. Peter.....	1		
Cathcart & Phillip Square	1		
Canal & Montmorenci.....			
Craig & Shaw.			
Craig & St. Elizabeth.....			
D		ST.	
Dorchester & St. Monique...		Antoine & Cathedral.....	21
Dorchester & Hanover.....		Bernard & St. Alexander....	17
Drummond at Rink.....		Catherine & St. Mark.	15
Dorchester & Drummond.	23	Catherine & Labelle.....	28
Drummond above St. Catherine..	23	Catherine & Panet.....	22
Dalhousie Square.....	16	Catherine & Union avenue. .	19
		Catherine & Delorimier.....	16
		Catherine & Suzan.	18
		Denis & St. Julie ..	17
		St. Famille 1st above Sherbrooke	26
		St. Hypolite above Roy.....	19
		St. James & Mountain.....	25
		St. James & Chatham	29
		St. James at Post Office	21
		St. James & St. Martin	29
		St. James & Fulford.....	20
		St. Martin below St. Antoine....	32
F			
Fullum 2nd above St. Catherine..	21		
Foundling & Port.....	18		

No. 1—SCHEDULE SHOWING THE DUTY OF TURBINE No. 1.

MONTHS.	Time of Pumping.	Revolutions.	Gallons pumped.	Castor Oil.	Tallow.	Coal Oil.	Cylinder Oil.	Valve-line.	Cotton Waste.	Coal for Heating.
	Hrs. M.									
IN POUNDS.										
1885										
January	744.00	613,924	143,044,262	129.25	35.00	222.00	.....	60.00	27.00	86910
February	672.00	530,125	123,519,125	96.75	.....	165.00	.....	.....	26.00	91670
March	436.40	239,859	55,887,147	58.50	.....	94.00	.....	.....	27.00	102399
April	291.10	208,449	48,591,917	58.50	18.00	106.00	.....	.....	18.00	62189
May	744.00	596,278	138,932,774	155.25	35.00	144.00	64.00	.....	25.37	4480
June	713.20	557,285	129,847,405	132.75	32.00	127.00	.....	.....	25.00	.....
July	744.00	619,442	143,863,986	146.25	42.00	140.00	.....	.....	29.56	.....
August	744.00	604,473	140,842,209	130.50	44.50	162.00	.....	.....	26.00	.....
September	575.55	437,761	101,998,313	114.56	20.00	131.00	.....	.....	11.37	.....
October	658.40	478,578	111,508,674	135.00	.....	166.00	.....	.....	27.00	21580
November	720.00	558,149	130,118,617	131.00	30.00	204.00	.....	15.00	27.00	60400
December	744.00	567,867	132,313,111	130.00	30.00	220.00	.....	30.00	27.00	87870
Total	7787.45	6,010,590	1,400,467,470	1,418.81	286.50	1,881.00	64.00	105.00	296.30	517480
Last Year	8690.15	6,802,182	1,584,094,406	1,426.50	272.00	1,841.99	Seal 60.87	120.00	314.82	307726

No. 2—SCHEDULE showing the duty of the Breast Wheel and of Turbines Nos. 2 and 3.

MONTHS.	Time of pumping.			Revolutions.			Gallons pumped.	IN POUNDS.		
	Breast Wheel.	Turbine		Breast Wheel.	Turbine No. 2.	Turbine No. 3.		Castor Oil.	Coal Oil.	Cotton Waste.
		No. 2.	No. 3.							
1885	Hrs. M.	Hrs. M.	Hrs. M.							
January	600.55	144.10	733.00	467,494	96,526	917,516	162,381,336	96.75	224.00	34.00
February	451.45	26.45	479.45	332,035	14,360	581,885	101,308,570	63.00	165.00	18.00
March . . . . .	.....	.....	307.20	.....	.....	65,855	5,663,520	18.00	94.00	28.00
April	342.15	232.00	677.40	236,487	97,843	413,035	85,001,850	90.00	107.00	18.00
May	687.10	736.55	743.35	516,236	506,937	897,694	228,630,400	198.00	144.00	32.25
June	703.15	710.30	720.00	533,921	499,100	857,583	226,639,246	184.50	127.00	32.10
July	729.15	729.55	744.00	558,197	525,453	932,193	240,548,798	229.50	140.00	31.25
August	740.40	701.25	743.15	565,565	506,262	925,367	238,211,958	225.00	163.00	32.00
September	529.10	562.35	603.50	401,568	385,107	704,361	177,002,946	159.25	141.50	15.00
October	627.25	635.10	661.25	464,131	451,695	816,589	206,064,902	204.75	163.00	31.00
November	719.25	718.15	720.00	566,781	538,291	904,058	241,290,644	258.75	204.00	32.25
December	730.05	540.35	744.00	560,547	373,508	899,584	215,604,364	198.00	220.00	33.56
Total	6,861.20	5,738.15	7,878.50	5,204,956	3,995,082	8,915,720	2,128,357,534	1,025.50	1,892.50	387.41
Last Year	7,459.30	4,206.30	5,479.55	5,732,794	2,874,589	8,590,857	2,012,364,386	1,521.12	1,815.10	343.25

Average Pressure on Pump Pistons.	IN POUNDS.					Cotton Waste.
	Castor Oil.	Coal Oil.	Seal Oil.	Cylinder Oil.	Val- voline.	
75	15.75	54.00	4.38	.....	96.00	.....
75	27.00	110.00	28.43	.....	408.00	28.00
75	152.87	320.00	100.62	728.87	778.75	80.87
76	87.75	224.00	85.31	498.75	508.62	63.50
.....
74	6.75	8.00	4.37	.....	36.62	16.00
75	4.50	24.00	19.93	.....	35.62	17.00
.....	24.62	74.18	15.31	.....	170.75	10.00
75	20.25	68.00	19.68	.....	152.00	10.00
75	.....	40.00	13.13	.....	16.00	.....
75	15.75	96.00	26.25	.....	96.00	14.00
75	355.24	1018.18	308.41	1225.62	2298.36	239.37

No. 4.—SCHEDULE showing the Duty of High Level Service Engine.

MONTHS.	Pumping Time.		Revolutions.	Gallons pumped.	Coal used, pounds.			Average Pressure on Pump Pistons.	In Pounds.		
	H.	M.			For Pumping.	For Banking Piers.	To raise 1,000,000 gallons.		Castor Oil.	Valvoline.	Cotton Waste.
1885											
January	251.20		271,792	3,261,514	32,846	7,288	12,305	100	2.00	35.00	2.00
February	236.55		262,858	3,154,296	31,656	6,654	12,145	100	2.00	25.37	5.00
March	272.20		303,874	3,646,488	33,785	7,713	11,380	100	1.00	37.00	8.00
April	215.00		236,530	2,838,360	24,783	5,617	10,710	100	2.00	18.00	5.00
May	282.55		334,027	4,009,324	35,219	6,641	10,705	100	3.00	23.00	2.00
June	309.55		346,811	4,161,732	35,345	6,770	10,112	100	2.00	31.00	5.00
July	295.45		340,443	4,085,316	35,748	6,784	10,411	100	2.00	31.00	5.00
August	262.00		275,877	3,309,804	30,219	7,494	9,648	100	1.00	28.00	12.00
September	290.25		297,233	3,566,796	32,549	8,196	11,423	100	3.50	32.00	6.00
October	219.15		256,546	3,078,552	29,529	7,526	12,037	100	3.00	25.00	5.00
November	234.30		234,964	2,819,568	28,525	6,753	12,512	100	1.00	39.00	6.00
December	271.30		254,528	3,054,336	30,956	6,981	14,352	100	1.50	31.00	3.00
Total....	3,41.50		3,415,423	40,986,086	388,220	84,317	11,528	100	24.00	352.27	64.00

No. 5.—**SCHEDULE** showing the depth of water, the rain fall and the average temperature at 9 a.m. at McTavish Street Reservoir.

MONTHS.	Average monthly Depth in feet.	Rain Gauges in inches.				Average tem- perature at 9 a. m.
		Rain.	Snow.	Snow reduced to Rain.	Total Rain.	
1885.						
January.....	22 32	1.17	19.75	1.14	2.31	11.58
February.....	22 24	.....	21.87	2.77	2.77	2.71
March.....	21 57	.....	29.25	2.63	2.63	9.13
April.....	20 86	.....	32.00	4.50	4.50	35.77
May.....	22 19	2.28	.....	...	2.28	52.10
June.....	22 28	2.85	.....	.....	2.85	61.80
July.....	21 79	2.37	.....	.....	2.37	67.81
August.....	21 91	1.99	.....	.....	1.99	61.68
September.....	20 06	3.44	.....	.....	3.44	53.93
October.....	20 79	6.52	3 00	1.00	7.52	43 74
November.....	22 07	1.90	5.00	0.30	2.20	32.43
December.....	22 30	0.73	24.00	1.91	2.64	18 74
The year.....						
		23 25	137.87	14.25	37.50	37.62
Last Year.....						
		24.95	120.01	11.07	36 02	40.15

No. 6.—Repairs to Mains, Hydrants and Valves during 1885.

Size.	12"	10"	6"	4"	Hydrant valves renewed.	Hydr'ts replaced by non freezing hydrants.	Hydrants replaced.	Hydrant Rods broken.
Main pipes broken	1	1	8	26				
Joints blown out.....	11	18	13	16				
Stop Valves renewed.....	0	1	2	3				
Valve spindles renewed.....	0	0	4	4				
	12	20	27	49	101	8	3	8

REPAIRS, ETC., TO SERVICES.

Leaking over drains.	Couplings leaking.	Burst in wall.	Cocks renewed.	Bows replaced by 3 way cocks.	Wooden Bows replaced by iron ones.	Pipes choked.
38	71	58	66	17	290	40

PIPES FROZEN, ETC., during the winter 1884-85.

Pipes frozen outside.	Pipes frozen inside.	Pipes frozen in wall.	Other causes.
126	193	360	60

New patent hydrants put in during the year 1885 11

New patent hydrants in position up to January 1886..... 187

Pneumatic cocks put in during the year 1885, (new work)..... 356

Hydrants frozen during the winter commencing in December 1884 and ending in April 1885.

Dec.	Jan.	Feb.	March.	April.	
114	540	672	928	60	Total... 414 hydrants frozen [2314 times.

No. 7.—COMPARATIVE TABLE showing the average daily consumption for each month and for each year, from 1876 to 1885,
in the City of Montreal.

	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
January.....	8,852,518	8,753,185	8,483,438	8,711,520	8,675,067	9,548,541	8,269,612	10,575,363	9,874,502	10,970,751
February.....	9,389,035	9,492,078	8,748,908	8,895,552	8,892,987	9,126,557	8,669,932	10,745,981	9,882,105	11,674,832
March.....	10,538,483	8,540,736	8,823,336	9,082,027	9,430,162	9,009,366	9,028,616	10,531,461	9,881,460	11,224,575
April.....	9,544,695	8,450,236	8,679,603	9,198,983	9,098,494	9,147,791	9,024,754	10,356,518	10,630,659	11,542,215
May.....	8,686,748	8,818,552	8,253,495	9,279,565	9,132,068	9,058,872	8,915,219	9,626,842	10,040,086	11,856,877
June.....	9,734,198	9,706,864	9,773,318	9,487,630	10,238,392	9,674,104	9,386,071	10,666,568	10,885,668	11,882,888
July.....	10,527,499	10,074,892	10,337,277	10,025,080	10,574,083	10,423,208	10,305,116	11,299,205	11,895,114	12,716,836
August.....	10,988,611	10,039,691	9,910,444	10,312,233	11,091,648	10,548,459	10,811,241	11,374,208	11,827,670	12,777,687
September.....	10,026,061	9,615,654	9,112,664	9,753,752	10,720,280	10,981,133	10,787,854	11,038,378	11,656,141	11,750,260
October.....	10,141,385	8,234,079	9,603,996	9,031,211	10,131,764	10,285,658	10,015,944	11,101,766	11,048,723	12,434,970
November.....	9,995,289	7,844,593	9,116,044	8,270,213	9,230,560	9,093,571	9,796,205	10,091,780	10,343,280	12,495,335
December.....	8,770,611	8,183,582	8,191,048	8,169,285	9,046,544	8,350,180	9,727,230	9,331,761	10,301,871	12,283,395
Daily average for each year.....	9,766,261	8,979,512	9,091,131	9,177,504	9,691,901	9,606,296	9,566,759	10,552,174	10,687,037	11,970,504
Incr. | over | preced- ing	981,044	.....	111,619	86,373	514,397	.....	.....	985,416	134,863	1,283,467
Deer. | year.... from	.....	786,749	.....	.....	.....	85,606	39,536	.....	.....	.....

Tab. 2.—Summary showing the different kinds and sizes of Water Meters belonging to the City and to private parties.

KINDS	Size in inches.	Property of the City.				Private Property.				Grand Total.
		In the City.	Outside the City.	At the Workshop.	Total.	In the City.	Outside the City.	At the Workshop.	Total.	
Gem	10			1	1					1
"	6	4	1	1	6					6
"	4	10	2	6	18					18
"	3	23		3	26	5			5	31
"	4	30		5	35	7		1	8	43
"	1½	7		4	11	4		1	5	16
"	1			7	7	1			1	8
"	6			6	12			2	2	14
"	6			67	73	1		3	4	77
Union	3			1	1					1
"	1	1		1	2	1			1	3
"	1	30	1		31	1			1	32
"	1½	112		15	127	4		1	5	132
Rotary Union	4			2	2					2
"	3	1			1			1	1	2
"	1½	2			2					2
"	1½	3		2	5					5
"	1	2		1	3					3
"	5			9	14					14
"	2			1	3					3
Crown	4	5	1		6					6
"	3	3			3					3
"	2	6	1	2	9					9
"	1½	4			4					4
"	1	21	1	4	26					26
"	3½	1		2	41					41
"	13			6	19					19
Worthington	3	2			2			1	1	3
"	2	7	1		8	6			6	14
"	1½	11		1	12	1			1	13
"	1	39	1	1	41					41
"	6	60		8	68	9		3	12	80
Continental	1			5	6					6
Empire	1	1			1					1
Siemen's	2	1			1					1
"	1			1	1					1
Undine	1			1	1					1
Maxime	1							1	1	1
Lewis	1			1	1					1
Equitable	1					1			1	1
"	1	1			1					1
Total		457	10	164	631	41		14	55	686

No 9.—SCHEDULE showing the Pipes, Hydrants, Valves, Services, etc., laid in the City of Montreal, during the year 1885.

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.			Number of Valves.				Hydrants.	Hours supplied.	Length of Lead Pipes in feet.	Brass Stop Cocks.	Faucets or stop Cocks.
	6 in.	4 in.	Total.	6 in.	4 in.	3 in.	Total.					
<i>East Ward.</i>												
Champ-de-Mars .....	.....	.....	.....	.....	.....	.....	.....	.....	2	12	.....	2
Bonsecours .....	—	.....	.....	.....	.....	.....	.....	.....	1	27	.....	1
Le Royer .....	.....	.....	.....	.....	.....	.....	.....	.....	1	30	.....	1
Total .....	.....	.....	.....	.....	.....	.....	.....	.....	4	69	.....	4
<i>Centre Ward.</i>												
Le Royer .....	.....	16	16	.....	1	.....	1	.....	.....	.....	.....	.....
Craig .....	.....	.....	.....	.....	.....	.....	.....	.....	1	21	1	.....
Notre-Dame .....	.....	.....	.....	.....	.....	.....	.....	.....	1	38	.....	1
Total	16	.....	16	.....	1	.....	1	.....	2	59	1	1
<i>West Ward.</i>												
St. Sacrement .....	.....	18	18	.....	1	.....	1	.....	.....	.....	.....	.....
St. George .....	.....	95	95	.....	1	.....	1	.....	.....	.....	.....	.....
Craig .....	.....	.....	.....	.....	.....	.....	.....	.....	2	11	2	.....
Commissioners .....	.....	.....	.....	.....	.....	.....	.....	.....	2	46	1	.....
St. Peter .....	.....	.....	.....	.....	.....	.....	.....	.....	2	104	.....	2
Fortification	23	.....	23	.....	1	.....	1	.....	2	35	.....	2
Total	136	.....	136	.....	3	.....	3	.....	8	196	3	4

Report showing the Pipes, etc., laid down. Continued.

NAME OF TUBE	Length in Feet of Cast Iron Pipe		Number of Valves				Horse Power	Cast Iron Pipes	Steel Pipes	Other Pipes
	On.	For	On.	For	Total					
Worcester Avenue	2 3	.....	2 14	.....	.....	2	44	.....	.....	2
St. Montpelier	.....	.....	22	92	1	3	18	2	.....	.....
St. Matthew	.....	.....	.....	.....	.....	0	372	.....	.....	0
St. Paul	100	.....	300	.....	1	0	122	3	.....	.....
St. David Lane	.....	.....	.....	.....	.....	1	18	.....	.....	1
Plymouth Grove	.....	.....	.....	.....	.....	12	303	.....	.....	12
Oakton	.....	.....	.....	.....	.....	4	01	.....	.....	4
McTavish	.....	.....	.....	.....	.....	2	111	2	.....	.....
Mackay	.....	.....	.....	.....	.....	7	310	.....	.....	.....
Lafayette	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Font	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Worcester Avenue	.....	.....	2	12	.....	.....	.....	.....	.....	.....
Dearfield Lane	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cady	14	14	.....	.....	.....	2	41	1	.....	.....
Bisson	.....	.....	.....	.....	.....	2	20	1	.....	.....
Beaver	18	18	.....	.....	.....	.....	.....	.....	.....	.....
Aylmer	.....	.....	.....	.....	.....	0	81	4	.....	.....
St. Alexander	.....	.....	.....	.....	.....	4	02	.....	.....	.....
Inspector	27	27	.....	.....	.....	.....	.....	.....	.....	.....
Fulford	51	51	.....	.....	.....	2	.....	.....	.....	.....
St. Antoine	.....	.....	.....	.....	.....	0	30	1	.....	.....
Donaghy	.....	.....	.....	.....	.....	3	101	1	.....	.....

Schedule showing the Pipes, etc., laid down. Continued.

NAME OF STREET.	Length in feet in Cast Iron Pipes.		Number of Valves			Inches in Diameter	Length in Feet	Number of Pipes	Length in Feet	Number of Pipes	Length in Feet	Number of Pipes
	6 in.	1 in.	Total	6 in.	1 in.	Total						
Brought forward												
Chenueville	721		721									
Balmoral			791	2		2						
Anderson	171		171					4	103	2		
St. Bernard								4	20	1		
Park avenue			17					11	301	11		
Laughauchiere								2	42	2		
Dowd								1	65	1		
Evans lane								1	40	1		
Berthelot								1	17	1		
St. George	450		450	1		1						
St. Urban								4	100	2		
Bleury								3	63	1		
St. Lawrence								5	463	4		
Arade								1	34	1		
St. Edward	54		54									
Total	2162	414	2576	6				56	1356	18	30	
St. Louis Ward.												
Vitré	135		135					9	190	9		
St. Catherine								1	32	1		
Ontario								4	98	4		
Mignonne								4	104	4		

Leduc lane	180	180	1	1	4	56	4
Ernest	180	180	1	1	1	33	1
Craig	48	48	1	1	1	11	1
Dumarais	327	327	1	1	2	38	2
Dulord	181	181	1	1	2	44	2
Dorchester	189	189	2	2	9	290	6
Charbonneau	135	135	1	1	1	46	1
St. Elizabeth	189	189	2	2	11	419	11
Cadieux	130	130	1	1	4	198	3
Albina	16	16	2	2	2	16	2
St. Constant	513	513	9	9	8	143	4
St. Denis	54	54	3	3	17	386	6
St. Dominique	268	268	12	12	17	48	5
Rivard	347	347	121	121	36	69	3
Sanguinet	8	8	1	1	1	1	1
German	8	8	1	1	1	1	1
St. Hypolite	8	8	1	1	1	1	1
Total	505	820	1325	3	5	1	1
<i>St. James Ward.</i>							
Wolfe	9	9	2	2	3	36	3
Marie Joseph	46	46	1	1	1	35	1
St. Louis	18	18	1	1	1	13	1
Robin	43	43	1	1	2	30	1
Perthus	116	116	1	1	1	20	1
Notre Dame	91	91	2	2	5	91	2
Maple	252	252	14	14	6	7	7
Louis Hypolite	1	1	1	1	1	1	1
Labelle	1	1	1	1	1	1	1
Dorchester	1	1	1	1	1	1	1
Carried over	116	116	1	1	1	1	1

SCHEDULE showing the Pipes, etc., laid down. *Continued.*

NAMES OF STREETS.	Length in feet of Cast Iron Pipes.			Number of Valves.			Hydrants	Houses supplied.	Length of Lead Pipes in feet.	Brass Stop Cocks.	Pneumatic Cocks.
	6 in.		Total.	6 in.	3 in.						
	4 in.	Total.			4 in.	3 in.					
Brought forward.											
Cherrier	116		116		1		2	14	252	6	1
Laguachetière	18		18				1	4	260	2	2
St. Hubert	657		657					3	48	1	2
St. Christophe					1			4	170	1	2
Craig	63		63					6	125	3	
St. André								1	69	1	
Ontario					1			11	231	4	4
Beaudry								9	152	5	
Jacques Cartier								2	59	2	
Brook								6	127	4	
Berri	387		387					1	18	1	
Montcalm	2		2		1			4	98	2	1
Total	1044	199	1243	3	2		4	65	1609	32	18
<i>St. Mary's Ward.</i>											
Visitation											
St. Rose								11	131		11
St. Pierre lane								4	76		4
St. Ignace								1	22		1
Sherbrooke								5	114	1	4
Pontpart								4	88	2	
Parthenais	45		45					3	17	2	
Iberville	9		9		1			2	90		2
								4	70		

Dufresne	70	70	1	1	1	14	215	3
De Salaberry						2	38	2
Craig						3	110	2
Allard						1	32	1
Kent	70	70	1	1	1			
Suzanne						3	81	1
Mignonne	9	9				3	104	2
Lagauchetière			1	1	1	4	80	4
Papineau Road						7	234	1
Plessis						11	400	3
Panet						6	105	2
Ontario						9	155	5
St. Catherine						6	156	3
Shaw						11	199	11
Fullum						8	150	1
ChAMPLAIN						9	161	5
DeMaisonnette						10	247	5
Dorchester						3	75	2
Total	133	133	1	2	3	144	2170	42 72
<i>Hochelaga Ward.</i>								
Notre Dame						12	375	7
Dzery						18	340	10
Frontenac						1	37	1
Frontenac						2	55	1
St. Michel	100	100						
Mignonne							125	2
Harbour						1	43	1
Logan						3	74	3
Marlborough						5	107	3
St. Catherine	100	100				2	34	1
Iberville						8	142	4
Total	200	200				55	1332	30 5

1. The first step is to identify the problem.

1000-8111-8111-8111

Name of Worker	Length in feet of Cord from Paper			Number of Values			Total	Total Values	Total Cords	Total Cords per Worker
	0 in	4 in	Total	0 in	4 in	Total				
End
Cord	...	10	10	1	1	2	...	...	...	...
West	...	100	100	...	...	...	...	...	...	...
W. Ann's
W. Andrew
W. Lawrence
W. Louis
W. James
W. Mary
Hochelaga
Grand Total	1246	103	7408	13	25	38	...	...	...	...

No. 10.— SCHEDULE showing the Pipes, Hydrants and Valves, laid down, and the number of houses supplied with water in the City of Montreal, up to 1st January 1886.

WARDS.	MAIN PIPES.												VALVES.												Hydrants.		Services
																									Public.	Private.	
	30	24	16	12	10	8	6	4	3	1½	Pipes	Total.	30	24	16	12	10	8	6	4	3	2½	Total.				
East.....					3873	290	4842	7849	713	80	17047						5	1	7	36	2		45	82	1	756	
Centre.....					3981	22	5058	6392	161	80	16114						4		11	27	7		42	20	2	681	
West.....			654	950	5024	676	6197	9022	585		31116						10	1	11	33	18		72	36		798	
St. Ann's.....					6786	19675	615	22669	57135	653	123115393						12	24	1	37	104	3	182	155	15	3495	
St. Antoine.....	134	1372	194	26986	10092	345	33993	104301	523	442	2682184771	1	4	1	32	14	2	56	179	5		204	244	6	6011		
St. Lawrence.....	2135			1674	4241	9773	17391	98590			310	87914					1	6	3	51	52	1	53	79		2700	
St. Louis.....	1645			93	1118	63	17631	33216			3215	68650					0	9	1	23	25		28	58		3156	
St. James.....	2488			60	239		29	32	42344		630	77794	1				2	2	1	34	66		100	104	2	5188	
St. Mary's.....	2985	5540	100	52	8338		46623	37430	66		2856	103048	1	2	1	3	11		6	56		138	111	6	4781		
Hochelega.....					6167		9563	1377			455	20767					3		6	16	1	25	31		895		
Total.....	10193	6312	2694	36607	75069	9853	103659	314011	2096	557	12133	686185	4	6	3	54	84	10	277	617	38	1104	899	32	28652		
Riding Mans.....	12930	26606		1674			15					41225	6	23	1	2				2			34			3	
Exhibition Grounds.....								5184				5481									3		4				
Grand Trunk Railway.....																											
Point St. Charles.....								7739	1861			9698													20		
Total.....	23123	32918	2694	38281	75069	9853	201411	347856	2096	557	12133	74249	10	29	4	56	84	10	276	620	38	1131	903	52	28655		

No. 11. — Statement showing the average pressure in the City Mains during the year 1885.

MONTHS.	At various points in the City Mains															
	Height above datum	12.00	32.00	57.00	27.00	.....	57.00	60.00	70.50	43.00	30.00	139.00	75.00	30.00	14.00	205.00
1885																
January	65.00	72.00	57.00	76.00	75.00	75.00	41.00	64.00	64.00	71.00	68.00	30.00	66.00	67.00	69.00	
February	65.00	72.00	57.00	75.00	75.00	73.00	11.00	55.00	64.00	71.00	68.00	30.00	65.00	67.00	70.00	
March	65.00	72.00	58.00	76.00	76.00	74.00	10.00	61.00	64.00	71.00	67.00	36.00	66.00	67.00	68.00	
April	65.00	72.00	58.00	75.00	75.00	72.00	41.00	60.00	62.00	71.00	67.00	30.00	66.00	65.00	66.00	
May	65.00	72.00	60.00	75.00	75.00	74.00	10.00	46.00	64.40	72.00	69.00	30.00	66.00	66.00	68.00	
June	65.00	72.00	62.00	75.00	75.00	72.00	15.00	43.00	63.00	71.00	67.00	30.00	66.00	67.00	67.00	
July	65.00	72.00	59.00	75.00	75.00	74.00	16.00	57.00	62.00	71.00	68.00	30.00	66.00	67.00	69.00	
August	65.00	72.00	57.00	75.00	75.00	.....	45.00	64.00	62.00	71.00	68.00	30.00	66.00	67.00	68.00	
September	65.00	72.00	52.00	75.00	75.00	.....	15.00	69.00	62.00	71.00	67.00	30.00	66.00	67.00	69.00	
October	65.00	72.00	54.00	75.00	75.00	.....	45.00	64.00	62.00	71.00	68.00	30.00	65.00	67.00	68.00	
November	65.00	72.00	52.00	75.00	75.00	.....	15.00	67.00	63.00	71.00	67.00	30.00	65.00	67.00	67.00	
December	65.00	74.00	50.00	75.00	75.00	.....	46.00	68.00	64.00	71.00	68.00	30.00	66.00	67.00	69.00	
7 mths																
Average 1885	65.00	72.00	56.00	75.00	75.00	73.00	44.00	64.00	63.00	71.00	68.00	30.00	66.00	67.00	68.00	
" 1884	65.00	72.00	.....	75.00	75.00	75.00	48.00	80.00	62.00	72.00	68.00	30.00	66.00	68.00	69.00	

SCHEDULE No. 12.

TABLE showing the positions of Public Fountains erected in the
City of Montreal, up to January 1886.

No.	LOCALITY.	Cast Iron Basins.	Stone and Ce- ment Basins.	Stone Fountains.	Iron Fountains.	Wood Fountains.	Cattle Water Troughs.	Number of Jets.
1	Beaver Hall Square				1			2
2	Bellerive Park	1			1			2
3	Bleury and Dorchester			1				1
4	Bonsecours Market					2		2
5	Chaboillez Square						1	1
6	Custom House Square				1		1	1
7	Court House Square	2	1	2				5
8	Craig at Victoria Square			1			3	1
9	Craig opposite Drill Hall				1			1
10	Dorchester and Dominion Sq.				1		1	1
11	Dorchester and Visitation					1		1
12	Grey Nuns and Common						1	1
13	Guilbault and St. Lawrence				1		1	1
14	Hay Market and College street					1	1	1
15	High Level Reservoir				1			2
16	J. Cartier Sq. and St. Paul st.	1			1		1	5
17	Kennedy Street				1		1	2
18	McTavish st. opp. Reservoir				1			1
19	McGill and Common Ex. W. H.			1				1
20	Mill at Waste Weir					1	1	2
21	Moreau near Notre-Dame				1			1
22	Ontario and St. Denis					1	1	2
23	Ontario and Champlain					1	1	2
24	Papineau Square					1	1	2
25	Phillip Square				1			1
26	do and St. Catherine						1	1
27	Place d'Armes	2	1					5
28	Prince and Common				1		1	2
29	Richmond Square		2		1			3
30	Seigneurs and Basin				1		1	2
31	Sherbrooke near Drummond					1	1	1
32	Sherbrooke and Guy					1	1	1
33	Ste Ann's Market					4		2
34	St. Antoine Market				1		1	2
35	St. Catherine and Papineau Road					1	1	2
36	St. Gabriel Market					1	1	2
37	Notre-Dame near Suzanne				1		1	2
38	St. Thomas and Ottawa					1	1	2
39	St. Louis Park	1			2			7
40	Victoria Sq. south of Craig		1	2				7
41	do north of Craig	3						4
42	Viger Sq. Basin No. 1		1					1
43	do do No. 2	3						9
44	do			1	1			2
45	Viger Market					2	6	6
46	Wellington and St. Patrick					1	1	2
47	Wellington & Centre	1						1
Total		14	6	8	20	20	32	108

SCHEDULE No. 12.—*Continued.*

No.	LOCALITY. At Exhibition Grounds,	Wood	Cattle Water	Removed	Number of Jets.
		Fountains	Troughs,	1885.	
1	Opposite Crystal Palace			1	...
2	At Horse Ring				2
3	Distributed over grounds		12		12
4	For Ice Water	2			8
5	St. Urbain st. and Mount Royal Avenue			1	...
6	Bleury street and Mount Royal Avenue			1	...
7	Opposite Agricultural Buildings	1			1
8	Distributed over grounds for fire purposes				4
		3	12	3	27

ALONG THE WHARFS.		Iron	Wood	Cattle Water	Urinals.	Number of Jets.
LOCALITY.		Fountains.	Fountains.	Troughs,		
1	Wind Mill Point		1	1	1	3
2	Allan's Wharf	1			1	2
3	Allan's Sluice			1		2
4	Opposite Custom House				1	1
5	King's Basin	1				1
6	Dominion Line			1	1	2
7	Foot of Jacques-Cartier Square	1				1
8	Beaver Line			1	1	3
9	Donaldson Line				1	1
10	Longueuil Ferry				1	1
11	Foot of Marlborough street				1	1
		3	1		5	19

ADMINISTRATION.

No. 13—STATEMENT Shewing the various details of the expenditure of the Montreal Water Works Department for the civic year ending December 31st 1885.

	cts.	\$	cts.	cts.
AQUEDUCT.				
Repairs to fences	136	60		
Repairs to bridges and painting	389	36		
Two new Stop Logs.....	107	78		
Cleaning Ditches, \$130. Berm \$100...	370	50		
Repairs on Regulating Gates Bridge.....	1478	25		
Repairs to house at Entrance	130	41		
Cutting weeds.....	113	40		
Guardian's salary	600	00		
Sundries.....	170	64		
			3496	94

WHEEL HOUSE.

D. Kearney, Chief Engineer.....	1600	00		
Candlish, asst. do	700	00		
Vallée, do do	700	00		
Lafond & Lecours, oilers.....	880	00		
Repairs to machinery.....	419	62		
Do buildings.....	353	10		
Grounds round buildings.....	125	47		
Sundries.....	180	74		
Supplies, Oil, Tallow, &c.....	1098	37		
			6057	30

ENGINE HOUSE.

Repairs to Engines and Boilers.....	400	88		
Repairs to Buildings.....	196	86		
Coal for steam.....	6327	70		
Wages	4038	40		
Rent for land	50	00		
S. Veary, engineer.....	1000	00		
Sundries.....	53	68		
Supplies, Oil, Tallow, &c.....	1233	94		
			13301	46
Carried over			22855	70

Brought over.....22855 70

TAIL RACE.

Repairs to fences and bridges on Lower

Lachine Road.....	140 44	
Repairs to fences ..	77 17	
	<hr/>	217 61

PIPE TRACK.

Repairs to Valve Chambers.....	214 73	
Filling up slope on Airwater Avenue	8 40	
	<hr/>	223 13

RESERVOIRS.

Guardian's salary	800 00	
McTavish: Repairs	151 95	
Shovelling snow.....	62 32	
Fuel and Lights.....	106 69	
Sundries.....	68 48	
	<hr/>	1189 44

HYDRANTS

Inspecting, Wages.....	3685 54	
Repairing, Wages and Materials	1797 92	
Thawing, horse and laborers.....	778 16	
	<hr/>	6261 62

PUBLIC FOUNTAINS.

Repairing: Wages	738 84	
do Materials.....	491 51	
New fountains	600 00	
	<hr/>	1830 35

DISTRIBUTION PIPES.

Repairs to Mains, Services and Valves,		
wages.....	8384 69	
Thawing Pipes and carting Water.	3426 98	
Inspecting Service Pipes inside of Houses	2056 80	
Repairs to Footpaths and Service Boxes,		
wages	1941 18	
Materials: Iron Castings, Lead, Tin, &c	122 75	
do Wood, Planks, Nails, &c.....	343 07	
do Brick, Cement, Sand, &c.....	38 08	
do Rope, Drain, Pipes, &c.....	9 60	
	<hr/>	16333 15

Carried over..... 48911 0

Brought over.....48911 00

WORKSHOP ON LAGAUCHETIERE ST.

Wages: Foreman, Clerks, Turncocks, Mechanics, Laborers, Carters and Night watchman	6273 67	
Iron, Spikes, Nails, Tin, Lead, &c.....	54 07	
Timber, Woad, Coal Oil, Lamps, &c....	92 72	
Tools, Pails, Drinking Cups, &c.....	412 43	
Rent of Foreman's House.....	200 00	
Telephone and Connection with Police Station and City Ex.....	280 94	
Fuel and Light	309 53	
Sundries.	189 56	
	<hr/>	7812 92

WORKSHOP AT WHEEL HOUSE.

Wages, 4 Mechanics (part of time)	242 34	
Materials, Iron, Copper, Lead, &c.....	38 07	
	<hr/>	280 41

METER DEPARTMENT.

Two Meter Inspectors.....	1688 76	
Testing, Placing and rep. Meters	2073 89	
New Meters	2036 58	
	<hr/>	5799 23

ENGINE HOUSE AT McTAVISH ST.

One Stoker and one Assistant Engineer.	1387 11	
Fuel for Engine	1181 24	
Oil, Tallow, &c.....	44 79	
Repairs to Building.....	25 08	
do Machinery.....	20 55	
do Chimney	620 48	
	<hr/>	3279 25

MISCELLANEOUS.

Contingencies for office, drawing paper, &c., ink, colours, instruments, &c...	225 39	
Postage, stamps, carters, sundries,	313 56	
Horse keep, superintendent	600 00	
Damages.....	422 79	
School taxes and assessments outside municipalities	4634 69	
	<hr/>	6196 43

Carried over72279 24

Brought over.....72279 24

STAFF.

Superintendent	3500 00	
Assistant Superintendent.....	2000 00	
Draughtsman	936 00	
Clerk	1000 00	
Junior Clerk.....	600 00	
	<hr/>	8036 00
		<hr/> 80315 24

LOANS.

PIPE LAYING.

Wages	11813 13	
• Lead pipes, lead, zinc.....	4208 99	
Copper, brass work	327 69	
Timber	129 66	
Bricks, lime, sand.....	338 93	
Drain pipes, cement	83 44	
Special castings.....	1608 84	
Iron, steel, iron pipes	573 96	
Tools, packing	164 21	
Cast iron Pipes.....	3960 05	
Valve stones.....	121 50	
Sundries	169 81	
	<hr/>	23500 21
New Engine		7640 79
		<hr/>
Grand total.....		\$111456 24

No. 14—Inventory of Stock on hand, January 1886.

DESCRIPTION.	30 in.	24 in.	16 in.	12 in.	10 in.	8 in.	6 in.	4 in.	3 in.
Cast Iron Pipes, in feet (new).....	984	522	492	4093	540	954	18162	1512	0
Cast Iron Pipes, in feet (Old).....	0	144	0	0	0	0	3681	1242	0
Stop Valves.....	2	4	2	0	1	4	4	8	19
Slip Sockets.....	9	32	8	10	14	12	10	9	16
Cast Iron Caps.....	3	0	4	18	4	3	33	19	0
" Plugs.....	2	5	4	17	15	14	11	25	0
" Double Bends.....	0	0	0	0	0	0	4	7	0
" Elbows.....	0	0	0	17	13	0	13	6	0

Size.	30x24	30x12	30x6	30x4	12x12	12x10	12x8	12x6	10x10	10x8	10x4	8x8	8x6	8x4	6x4	4x4	4x3	4x2
Cross Pipes.....	1	5	2	1	10	11	4	2	1	3	2	6	18	5	4	2	8	4

Size.	30x12	30x4	16x10	12x12	12x10	12x6	12x4	10x10	10x8	10x6	10x4	8x6	8x4	6x6	6x4	4x4	4x3	4x2
Tee pipes.....	5	1	1	7	6	1	3	2	5	2	2	7	2	5	1	4	1	1

Size.	30x30	30x24	24x24	12x12	12x10	10x10	6x6
Breeches pipes.....	4	2	3	2	2	5	6

Size.	30x24	12x10	12x6	10x8	10x6	8x6	6x4	6x3	4x3	16x12
Tapers.....	8	1	9	2	11	5	12	1	8	2

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No. 15.—**SCHEDULE** showing the number of Asses-ed Dwellings, Stores, Shops, Offices, Warehouses, Manufactories, Hotels, &c., in the City of Montreal, for the year 1885-86, with the Assessed Water Rates thereon.

DWELLINGS

Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number Assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
2843	2765	78	\$5.00	28502	28141	361	.....
3697	3637	60	5.75	7	7	....	\$30.50
4175	4427	48	6.50	50	50	....	31.25
4001	3962	39	7.25	1	1	....	32.00
2195	2161	35	8.00	224	222	2	32.75
1910	1878	32	8.75	39	39	....	34.25
799	793	6	9.50	3	3	....	35.00
1734	1722	12	10.25	15	15	....	35.75
300	297	3	11.00	90	89	1	36.50
1181	1172	9	11.75	12	12	....	37.25
250	249	1	12.50	3	3	....	38.75
650	644	6	13.25	152	150	2	40.25
420	413	7	14.00	9	9	....	41.75
613	608	5	14.75	9	9	....	43.25
149	148	1	15.50	41	41	....	44.00
421	418	3	16.25	89	86	3	47.75
13	11	2	17.00	3	3	....	49.25
616	641	5	17.75	16	16	....	51.50
45	45	....	18.50	4	4	....	52.25
224	224	....	19.25	66	66	....	55.25
64	64	....	20.00	2	2	....	56.75
275	274	1	20.75	13	13	....	59.00
105	103	2	21.50	4	4	....	62.00
300	300	....	22.25	53	53	....	62.75
46	46	....	23.00	3	3	....	66.50
120	120	....	23.75	15	15	....	70.25
1	1	....	24.50	1	1	....	75.50
359	354	5	25.25	21	20	1	77.75
3	3	....	26.00	2	2	....	85.25
290	290	....	26.75	11	11	....	92.75
6	6	....	27.50	7	7	....	107.75
127	126	1	28.25	3	3	....	122.75
99	99	....	29.00	1	1	....	125.00
141	141	....	29.75	1	1	....	152.75
28502	28141	361		29472	29102	370	

Year	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099
1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	

SCHEDULE showing the number of Dwellings, &c.—(Continued.)

HOTELS AND TAVERNS.

Number assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.	Number assessed.	Tenanted.	Vacant and not supplied.	Yearly Rate.
83	82	1	\$12 00	334	333	1	
81	81	.....	17 00	4	4	.....	\$52.00
73	73	.....	22 00	4	4	.....	62.00
28	28	.....	27 00	2	2	.....	67.00
37	37	.....	32 00	2	2	.....	72.00
20	20	.....	37 00	1	1	.....	82.00
10	10	.....	42 00	1	1	.....	152.00
2	2	.....	47 00	1	1	.....	162.00
334	333	1		349	348	1	

HORSES.		COWS.		STALLS.		URINALS.		WATER CLOSETS.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
4621	\$2.00	782	\$1.00	471	\$1.00	612	\$1.00	542	\$2.00
				279	2 00	38	1.50	1135	3.00
						14	3.00	8819	4.00
						13	15.00	17	15.00
4621		782		750		677		10513	

SPECIAL RATES.

BAKERIES.		BEER BOTTLERS.		FOUNTAINS.		STEAM ENGINES.		SUNDRIES.	
No.	Rate.	No.	Rate.	No.	Rate.	No.	Horse power.	Total.	No. Rate.
4	\$5 00	1	\$3.00	2	\$3.00	1	4	8	\$ 5.00
5	8.00	11	6.00	28	5.00	8	1	8	1 6.00
1	9.00	5	10.00	2	8 00	19	2	38	1 8.00
6	10.00	1	12.00	1	9.00	14	3	42	4 10.00
1	11.00	1	15.00	6	10.00	14	4	56	2 15.00
11	12.00			4	12.00	13	5	65	1 17.00
13	15.00			3	15.00	4	6	24	1 25.00
3	18.00			4	18.00	9	7	63	4 40.00
6	20.00			1	40.00	7	8	56	1 50.00
1	23.00			1	50.00	2	9	18	1 600.00
1	25.00					5	10	50	1 750.00
1	27.00					2	12	24	
3	30.00					1	15	15	
						7	20	140	
						1	21	21	
						1	22	22	
						1	25	25	
						1	40	40	
						2	42	84	
56		19		52		112		791½	25

RECAPITULATION.

	Tenanted.	Vacant.	Total.
Dwellings.....	29102	370	29472
Shops, shops, offices.....	6073	456	6529
Stalls and taverns.....	348	1	349
Total.....	35523	827	36350
Steam engines.....			112
Special charges for manufacturing, &c.....			152
Horse stalls.....			750
Water closets.....			10513
Urinals.....			677
Horses.....			4621
Cows.....			782

CASH RECEIPTS BY THE WATER DEPARTMENT

During Civil year ending 31st December 1885.

For dwellings, shops, offices and hotels.....	\$327189.78
" Water closets.....	36417.00
" Urinals.....	873.00
" Horses.....	8082.00
" Cows.....	715.00
" Horse stalls.....	971.00
" Steam engines.....	4504.50
" Permits for hose to water streets, &c.....	502.00
" " for building purposes.....	2680.78
" Private fountains.....	477.00
" Manufactories, &c.....	1228.00
" Water supplied through meters outside the City limits.....	4395.04
" " " " inside.....	50897.41
" Rent of meters outside City limits.....	180.24
" " " " inside.....	2765.68
	2945.92
	\$441878.43
Miscellaneous.....	2711.15
Costs.....	68.13
	\$444657.71
Less refunded.....	760.13
Net collections.....	\$443897.58
Amount returned into the Treasury in 1884.....	463622.84
Decrease.....	\$ 19725.26

CHAS. LAPIERRE,

City Treasurer Office, Montreal April 1886.

Accountant M. W. W.







